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COTTON PLANT. PLATE I.

THE COTTON QUESTION.

THE

PRODUCTION, EXPORT, MANUFACTURE, AND CONSUMPTION

OF

COTTON.

A CONDENSED TREATISE ON

COTTON IN ALL ITS ASPECTS: AGRICULTURAL, COMMERCIAL, AND POLITICAL.

ILLUSTRATED WITH ENGRAVINGS.

BY

WILLIAM J. BARBEE, M. D.,

OF DE SOTO COUNTY, MISSISSIPPI.

NEW YORK:
METROPOLITAN RECORD OFFICE, 424 BROOME ST.
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PREFACE.

THE object of this volume is to embody the principal information which we have obtained within the present century on the subject of COTTON, and present it in a convenient and available form for all who take an interest in the production of the most valuable plant on the face of the earth.

The author has obtained this information from various sources. 1st. From more than fifty volumes of Reports, Journals, Magazines, Reviews, and Treatises on Natural History. 2d. From intelligent planters, educated and uneducated men residing in various parts of the South, who, for many years, have been watching the tender plant from its uprising in May to its last lingering moments in December. 3d. From direct observation in the field with the naked eye and the glass.

To one and all from whom he has received information he returns his sincere thanks, and begs leave to express the hope that this volume may be a hand-book of intelligence on the subject of which it treats. The author has endeavored to present the most important matters connected with the production, distribution, and consumption of our great staple in a plain and systematic style, suited to the wants and wishes of the great army of industry occupying the country from the Atlantic to the Rio Grande. The Cotton question is one of deep and abiding importance, and it is one in which are involved the hopes and the interests of millions of the human race.

Let the Almighty blast the crop growing from California to China. Think of the result! Commerce would drop the sceptre, manufacturers stand crippled, capitalists look aghast, and naked myriads cry for bread.

But, if this be fancy's sketch, let us suppose another case. Let a government seek, by unjust legislation, to crush the only remaining hope of an oppressed people—to tie the hands of honest industry, to sicken the heart and madden the head of the toiling multitude—to enact the drama of Pharaoh and the land of Goshen—to restore, to its fullest extent, the policy of the lord and master of the

Colonies—*to establish taxation without representation*—think again, thoughtful reader, what must be the inevitable result?

Is it not a dreadful blight sent upon our fields by the poisoned breath of a national assembly?

We can stand the rot, the rust, the sore-shin, the caterpillar, the boll-worm; but, oh! may a kind Providence and coming patriots deliver us from the merciless tax of a radical Congress.

W. J. B.

SENATOSIA, MISS., *September* 1, 1866.

In the preparation of this book the following works have been consulted, and liberal extracts made from them, viz.:

Patent-Office Reports, 1854, '55, '56, '57.

New American Cyclopædia—article "Cotton."

Wailes's "Agriculture and Geology of Mississippi."

Report on Geology of Mississippi, by Professor Harper.

Report on Geology of Mississippi, by Professor Hilgard.

Report on Geology of Alabama, by Professor Tuomey.

Report on Geology of South Carolina, by Professor Brumby.

Wilson's "Ornithology."

Audubon's "Quadrupeds of North America."

"Life of North American Insects," by Professor Jaeger.

De Bow's "Review," ten volumes.

Troost and Curry's "Report on Geology of Tennessee."

Johnston's "Agricultural Chemistry."

Liebig's "Agricultural Chemistry."

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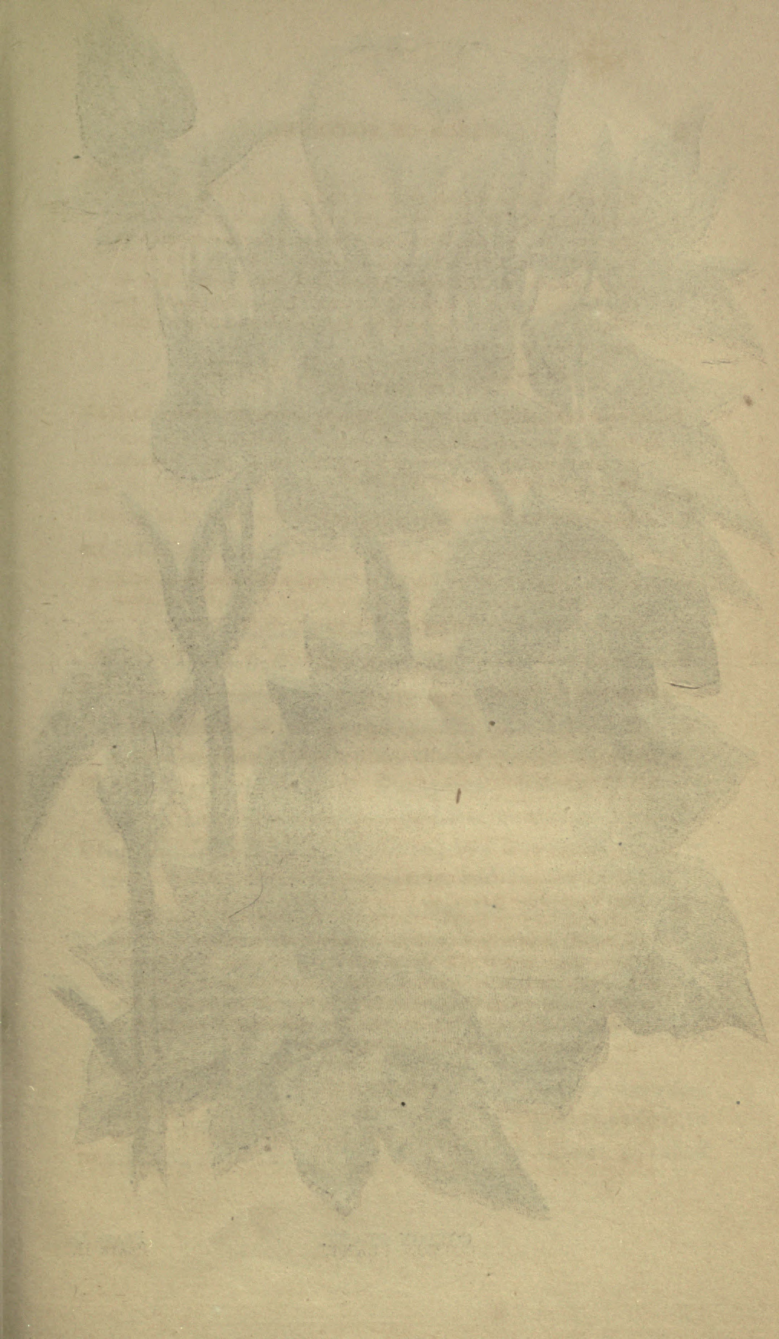
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COTTON PLANT. PLATE II.

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COTTON.

CHAPTER I.

BOTANICAL ANALYSIS AND DESCRIPTION—THE FLOWER AND THE FRUIT.

An examination of the flower of the cotton plant shows that it belongs to the 15th class, 12th order of the Linnæan system, *Monadelphia polyandria.*

According to the natural system, it takes rank with the *Malvaceæ*, which embrace the *mallow*, *hollyhock*, *okra*, &c.

The generic name is *Gossypium.* Fifteen or twenty species have been described by Linnæus and De Candolle, the principal of which are *Gossypium herbaceum*, *G. arboreum*, *G. hirsutum*, *G. religiosum*, and *G. Barbadense.*

The writer is disposed to adopt the opinion that these are mere varieties of one original species, although the weight of authority is against him.

Be this as it may, cotton appears in the fields of the Southern States in three principal forms, viz., herbaceous, shrubby, and arborescent, or tree-like.

The cotton of our hill lands is an herb one to three feet high; that of the bottoms is shrub-like, growing often to the height of ten feet; that of the sea islands is called

arborescent. The cotton of the hills and bottoms is short-stapled; that of the sea islands is long stapled.

As more than nine-tenths of the cotton of the country belongs to the herbaceous species, I shall content myself by describing that alone, referring the reader to larger works for scientific details concerning the other species.

Gossypium herbaceum. Botanical characters. *Calyx* cup-shaped, obtusely 5-toothed, surrounded by a 3-parted involucel, called the *form*, and sometimes the *square*. *Leaves* 5-lobed, mucronate, large as a small hand. *Stem* smooth, herbaceous; woody fibre white, spongy, and brittle, covered by a greenish-brown epidermis, very tenacious.

The *branches* are long and jointed, bearing at the joints bolls of various sizes.

Root tapering, penetrating deep into the ground. For this reason the plant is less affected by drought than and other plant of the country.

Corolla cup-shaped, polypetalous, two or three inches long; resembles the okra blossom, only that it is never much expanded. It is white or cream-colored on the first day till the afternoon, when it changes gradually to a red color, closing up and twisting over the germ or young boll; and in a day or two drops off, leaving the boll surrounded by the calyx.

The *boll*, or egg-shaped capsule, has from 3 to 5 cells, many-seeded; seeds large and green, surrounded by a tomentose wool. This tomentose wool is the cotton which serves to clothe the nations of the earth.

From this description, it is evident to any one acquainted with the first lessons in botany, that cotton is simply a fruit. It is entitled to the name of fruit, as deservedly as an apple or a peach. The only difference is this: The apple or the peach is designed for food; the cotton is

designed for clothing. A fully developed apple and a fully developed cotton boll are homologous. The one is a *pome*, the other a *capsule*. The one consists of a pericarp or rind, pulp, and seed; so does the other. The pulp of the one is good to eat; the pulp of the other is good to wear. All fruit is a developed germ—the base of a pistil. In its origin, progress, and maturity, cotton obeys the law of fruit development as rigidly as any product of tree or shrub.

By reference to plates Nos. 1 and 2, the reader may have a fair view of the cotton plant and its fruit.

Plate 1 shows the cream-colored corolla on its first appearance, emerging above the form. Below this, on the left hand, is a green boll. On the right, about the middle of the plate, is a boll opening; and immediately below this is a fully expanded boll—the pericarp remaining after the cotton has been picked out.

Plate 2 shows, at the top, the blossom closing up after the change from a white to a pink color; at the bottom, a fully expanded boll—the pericarp concealed, and the cotton ready for picking.

CHAPTER II.

HISTORY OF COTTON.

Cotton was known to the ancients. Herodotus, 450 B. C., speaks of the trees of India bearing fleeces more delicate and beautiful than those of sheep, and says that the Indians used them for making cloth.

From India cotton was introduced into Greece and Rome, and the cloth used as tents by soldiers. Cæsar covered the Forum with it, and the Sacred Way from his own house to the Capitoline Hill.

Pliny speaks of wool-bearing trees in Upper Egypt, bearing a fruit like a gourd, of the size of a quince, which, upon ripening and bursting, displayed a downy wool, from which costly fabrics were made resembling linen.

At the beginning of the Christian era cotton had become an article of commerce, and the cotton fabrics of India were in great demand.

Spain was the first of European countries to adopt the cotton culture. It was introduced there as early as the tenth century by the Moors. About the same time it was extended to Sicily. The Venetians engaged in it about the fourteenth century, and the Turks about the same time introduced it into Roumelia and Macedonia.

The first notice of the English directing their attention

to the manufacture of cotton is found in the "Treasury of Traffic" of Lewis Roberts, 1641, in which it is stated that the Manchester Company "buy cotton wool in London that comes from Cyprus and Smyrna, and at home worke the same and perfect it into fustians, vermillions, dimities, and other stuffes."

In the early part of the eighteenth century the English received it from the East and West Indies.

In the New World, the manufacture of cotton cloth appears to have been well understood by the Mexicans and Peruvians, long before the discovery of their countries by Europeans. Columbus found the cotton plant growing wild in Hispaniola, and later explorers recognized it as far north as the country bordering the Meschachebe or Mississippi, and its tributaries. Cortes, on setting out from Trinidad, on the southern coast of Cuba, for his Mexican expedition, gathered it in abundance, to quilt the jackets of his soldiers, as a protection, after the practice of the natives, against the Indian arrows; and when on the Mexican coast, among the rich presents received by him from Montezuma, were coverlets and robes of cotton, fine as silk, of rich and various dyes, interwoven with feather work that rivalled the delicacy of painting.

The West India islands furnished to Great Britain, about the close of the last century, some forty thousand bales. The quality was the long staple.

In Brazil the crop of the valuable long-staple cotton has proved much more important, and the export of cotton from this country, in the early part of the present century, often exceeded that of any other except the United States.

In the United States cotton seed was first planted, as an experiment, in 1621. In the province of Carolina the growth of the cotton plant is noticed in a paper of the date

of 1666, preserved in Carroll's "Historical Collections of South Carolina." In 1736 the plant was known in gardens in lat. 39° N. on the eastern shore of Maryland; and about forty years afterwards it was cultivated in the county of Cape May, New Jersey. It was, however, very little known, except as a garden plant, until after the Revolutionary War.

In 1748 seven bags of cotton wool were exported from Charleston, S. C., valued at £3 11*s.* 5*d.* a bag.

In 1754 another small shipment was made. In 1770 three bags were exported. In 1784 eight bags, shipped to England, were seized, on the ground that so much cotton could not be produced in the United States.

The exports of the next six years were successively 14 bags; 6; 109; 389; 842; 81.

In 1790 England received only one bag of cotton from the United States in 1,000 bags imported; in 1792, 1 in 126; in 1795, 1 in 25; and in 1799, about one-ninth of the importation was from this country.

From the beginning of the present century to the breaking out of the late civil war, there has been, with the exception of a few years of decline interspersed at various periods, a steady increase of bales from 100,000 to 4,500,000. During the war there was, of course, a rapid decline, and the number of bales went down from four millions and a half to a half million, the number of the first semi-decennial period of the century.

This will be more fully exhibited in a separate chapter on Cotton Statistics.

CHAPTER III.

THE COTTON ZONE OF THE WORLD.

The cotton zone of the world is an immense territory. Lying between the 36th parallel of north latitude and the 36th of south latitude, it embraces in the Western hemisphere all the States of the South, including Tennessee and North Carolina, Mexico, Central America, West Indies, the States of South America as far as the mouth of the Rio de la Plata; and in the Eastern hemisphere, the whole of Africa, Arabia, Persia, India, China, East Indies, and nearly all of Australia.

The cotton zone occupies more than one-half of the arable land surface of the globe; but it must not be supposed that all, or even the principal part of the land in this zone, is suitable for cultivation. The Great Desert of Africa, for instance, would make poor plantations; so would the sides of mountains, and so would other localities which are unfit by reason of an unsuitable soil.

We mean, then, by this cotton zone, a broad belt of land, nearly 5,000 miles wide from north to south, and about 18,000 miles long from east to west, where the climate and seasons are adapted to the cultivation of cotton.

Now, as near the torrid zone we find intertropical fruits, so near this cotton zone we discover cotton growing

and cultivated to some extent; but, so far as our observations have extended in the last twenty years, the plant cannot be profitably cultivated north of 35½°.

A correct view of the limits of this wide region may be obtained by an examination of the climatic chart and a close inspection of the isothermal lines.

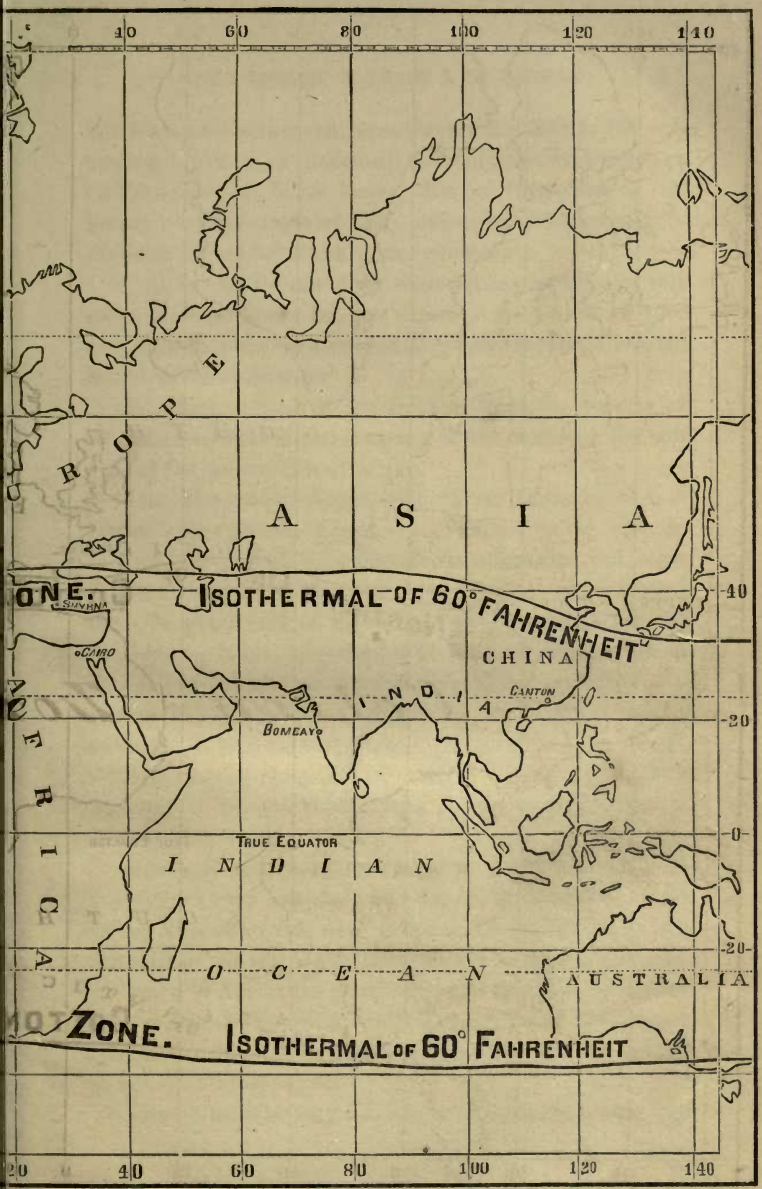
Isothermal lines are the lines of equal heat, extending around the globe. These lines do not coincide throughout with the parallels of latitude, but are always serpentine in their course. They have been determined by long-continued observation with the thermometer, and we present them to the view of the reader as the result of scientific labor performed through a long series of years.

The outside figures on the margin of this map indicate the degrees of latitude; the inside figures show the degree of temperature by Fahrenheit's thermometer. Latitude is indicated by degrees of distance;—isothermal lines are designated by degrees of heat, regardless of distance. Thus the true equator, or zero parallel, is a line passing from west to east without departing a hair's breadth from a direct course. It passes through the northern part of Brazil, S. A., thence across the Atlantic, and directly through the centre of Africa. The isothermal equator is a meandering line, which touches and crosses the true equator at different points. It passes entirely north of South America; thence curving gently, it strikes the true equator in longitude 20° W.; then curving northward, it passes through Guinea, Soudan, and Abyssinia, and proceeding eastward it makes its way through the southern part of Hindostan; thence curving through the East Indies, it crosses the true equator between Sumatra and Borneo.

The cotton zone embraces all that portion of the earth

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WASHINGTON
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NEW ORLEANS
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MEXICO
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BRAZIL
AMERICA
SOUTH
RIO JANEIRO
SOUTHERN
LIMIT OF COTTON
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in which the isothermal lines range from 60° to 80° and upward. We have indicated the northern and southern limits by broad, black lines. The northern line is the isotherm of 60° north of the equator; the southern line is the isotherm of 60° south of the equator.

Cotton can be raised to some profit, though not very large, on these lines; but we regard it as a waste of time and money to attempt its culture in any region where the isotherm falls below 60°.

We here subjoin a few extracts from the reports of American consuls in various parts of the world on the subject of the production of cotton.

1st. *Alexandria, Egypt.*—There are three species of cotton cultivated in Egypt. 1. The native, of very inferior quality, used in domestic manufactures, but never exported. 2. The *Mako* or *Jumel* cotton, which constitutes the great bulk of Egyptian, and is grown all through the Delta. It is a long-stapled cotton. 3. The *American Sea Island*, which has been cultivated in small quantities for the last fifteen years, but which has not had a great success. It will degenerate.

The annual product of cotton in Egypt is about 50,000,000 lbs. It is exported chiefly to Great Britain, France, and Austria.

The soil and climate are adapted to the profitable culture of cotton; but the yield depends greatly on the rise in the Nile, as no rain falls except in December. The only fertilizer of the soil is the alluvium of the river. The seeds are sown in April; the plant begins to flower early in July, and continues flowering until January; and the crop is gathered in September and October. The average product is about 250 lbs. per acre.

The cotton is very little injured by insects, the chief

obstacles being the superior advantages of grain-growing, and the unskilled labor of the country, which in agriculture is performed exclusively by the Fellahs, a race similar to the serfs of Russia. The cotton is badly cultivated and slovenly handled. Manufactories are unprofitable. The mean annual temperature of Egypt is 70°.

2d. *Algiers.*—The sea island, long-stapled, and Nankin species of cotton are cultivated in Algeria. The annual product is about 200,000 lbs. There are no manufactories. The entire crop is exported to Havre, where it is sold on account of the French Government.* Mean annual temperature, 64°.

3d. *Athens, Greece.*—The cotton of Greece grows from two to five feet in height. It is sown annually. The climate is well adapted to its growth, but the soil is not sufficiently rich. The short-stapled yields about 60 lbs. of fibre to the acre; the long-stapled, 300 lbs. It is badly cultivated. Mean annual temperature, 64°.

4th. *Bombay, British India.*—The amount of cotton produced in the districts under the Bombay Government is about 250,000,000 lbs. annually, of which about 63,000,000 lbs. is manufactured into coarse cloth, worn by the natives. The rest is exported.

Cotton is ginned in India both by the saw-gin and an instrument called the "churka," which is very simple in construction, resembling a roller and breaker, and turning out about 40 lbs. of clean cotton a day by the labor of two men. The gin is used by large speculators, and is propelled by bullocks, turning out 500 lbs. of clean cotton a day. The quantity of fibre obtained from 100 lbs. of seed cotton is usually about 31 lbs. Some of the gins in

* During the late war the increase in the culture of cotton was very great, and a much larger quantity than the above was exported.

use were made in England, but they are generally of Bombay manufacture. The ginning is done by speculators, who buy the cotton of the native growers at the market villages. It is then immediately packed, by means of screws, into bags or loose bales, containing 392 lbs. each. When these arrive at Bombay, they are put into the steam screw and hydraulic presses, and condensed to the uniform size of 4 feet 3 inches in length, 2 feet in width, and 18 inches in thickness.

The climate and soil are admirably adapted to the profitable growth of cotton. The cotton-growing months embrace June and February. The mean temperature of these months is about 90°. The seeds are planted early in June. The plants are in flower from the middle of July to the 10th of August. The cotton is picked in March. About 105 lbs. of clean and ginned cotton is the average product per acre. No insects affect the plant, but the political and social condition of the people has operated and will continue to operate to the prejudice of the cotton growth and trade, as long as the country is under the government of the East India Company.

5th. *Bordeaux, France.*—Many experiments have been made in this and the adjoining departments of France within the last fifteen years in the culture of cotton upon different varieties from India, Algeria, and America; but every attempt has proved an entire failure. The reader will discover, by a glance at the chart, that France is entirely north of the cotton zone.

6th. *Calcutta, British India.*—The cotton plant is indigenous in India, and has been cultivated by the inhabitants throughout the whole length and breadth of these extensive territories from a period anterior to historical record. The annual product of British India is 1,000,-

000,000 lbs. Of this amount 750,000,000 lbs. is used by the natives, the number of whom is 150,000,000. The remaining 250,000,000 lbs. is exported. This quantity would make 500,000 bales, American size.

The thermometer at Calcutta ranges from 71° mean in January to 93° mean in May.

The cotton cultivation extends from the extremity of the peninsula of Hindostan to the great Himalaya range. A longer drought than usual kills the cotton-plant; too much rain rots it; and if a shower falls at the season of harvest, insects attack the ripe pods, and the dampness discolors the fibre.

7th. *Sydney, Australia.*—The cotton plant is here a perennial, the frost, except in unusually severe winters, not being sufficient to destroy it. Cotton has been picked from the same stalk five years in succession, the fourth year producing the largest crop; a pound of clean cotton being then, in some instances, obtained from a single plant. The ordinary yield is a bale of 300 lbs. of clean cotton per acre. The seeds are planted in the latter part of September and the early part of October; the plants are in flower in December; picking commences in February and continues until June. The soil and climate and all other physical causes are favorable to the profitable growth of this crop. Insects are not injurious. Nature seems to have designed this portion of the world for a cotton field of the most gigantic dimensions. The thermometer, during the cotton months, ranges from 60° to 100°.

8th. *Spezzia, Italy.*—During the occupation of Italy by the French under the first Napoleon, it was one of his projects to introduce the cultivation of the cotton plant; but it failed generally throughout Northern Italy, and now is not known farther north than in some of the Papal States.

9th. *San Juan de los Remedios, Island of Cuba.*—The lands of this section of this island are equal to the best on Red River or the Mississippi for the growth of cotton, and the plant stands for years, but the cultivation of it is unknown.

10th. *Rio de Janeiro, Brazil.*—All kinds of cotton can be cultivated to advantage in the province of Rio de Janeiro, whether annual or perennial varieties; but the small quantity that is produced is almost exclusively tree-cotton. The general character of the fibre is long, strong, and coarse. The quantity manufactured here does not probably amount to 500,000 lbs. a year. Good ginned cotton is nearly all imported from Pernambuco, Bahia, and other northern ports of this empire. It is ginned mostly by roller-gins. A few saw-gins from the United States are in use. It is calculated that one negro can cultivate 2,000 hills of cotton, producing about 700 lbs. when ginned.

The soil and climate are finely adapted to the growth of cotton. The thermometer ranges from about 60° to 95° F. the whole year round, and cotton bears more or less all the time. The planting takes place in November. The plants flower mostly in June, but they open freely almost all the year. The bulk of the harvest is in September and October, but cotton is picked nearly all the year. No cause, physical, political, or social, except want of energy and enterprise, operates injuriously to the cultivation of cotton in this empire.

11th. *Paramaribo, Dutch Guiana.*—The herbaceous cotton, such as is grown in the United States, is regarded by the most approved authorities as the variety of cotton best adapted to cultivation in Dutch Guiana. It is here perennial, affording a crop every six months, and continuing to yield until four or five years old. The sea

island cotton of the United States soon degenerates. The average annual crop is 2,000,000 lbs., one-half of which is usually exported. All the land on the sea-shore is well adapted to the profitable growth of cotton. The usual yield to the acre is from 150 lbs. to 200 lbs. Planting takes place in April and May, flowering in July and August, picking from September to January. The range of the thermometer is quite limited, being from 75° to 85°. The temperature of all the months is quite uniform. Severe droughts and heavy, long-continued rains, together with a white insect, are disadvantages to the culture; but could scientific culture be applied, with a competency of laborers, the yield per acre would average 1,000 lbs. seed cotton.

12th. *La Paz, Lower California.*—When this country was discovered, a cotton tree was found growing wild, in great numbers, over the entire land, and until about twenty years ago the inhabitants manufactured thread and many other articles for home consumption from the fibre it produced; but the Mexican Government then prohibited its manufacture by the people, for the sake of the duties which might be obtained on imported articles. If any attention were given to collecting cotton from these trees, many millions of pounds could be gathered every year; and, by trimming the tree and watering it during the dry season, the quality of the fibre might be much improved.

The sea island cotton of the United States can be grown to great advantage here, and the lands of this territory are unsurpassed for producing sugar, rice, coffee, and grapes. Although the latitude of La Paz is only 24° N., the climate is so happily tempered by sea breezes, that labor can be performed by any race of men without inconvenience or detriment to health.

13th. *Buenos Ayres and Argentine Confederation.*—This entire region lies between 22° and 40° south latitude. The soil, in many places, is well adapted to the culture of cotton, but the climate is not altogether suitable. There is not a sufficient intensity either of heat or cold, continuing the requisite length of season, to urge the rapid growth and maturity of the stalk, and to check vegetation in the winter.

A large proportion of the produce of the Confederation has hitherto passed through the city of Buenos Ayres, and the full amount has never exceeded 50,000 lbs. per annum. One-half of the quantity produced is exported, and the other half consumed in the manufacture of rude domestic goods for family use.

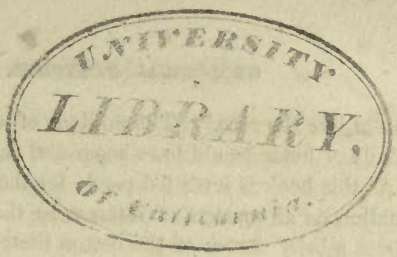
The cultivation is very rude. The wooden plough, which merely scratches the earth, is extensively used, and the hoe is applied so sparingly as to produce but little beneficial result.

The cotton is prepared on a rude roller-gin by foot or hand. It is packed by the same means in bags, without being pressed. Twenty-five lbs. of lint cotton are obtained from 100 lbs. of seed cotton.

Neither the physical nor the political condition of the country is adapted to agricultural pursuits. The peasantry of the country are indolent, except in such of their vocations as may be followed on horseback; and the peons are no better.

The "langosta," or locust, appears in the State of La Plata about once in five years, but not in all regions at the same time. These insects destroy every vestige of verdure wherever they alight, and their number is greater than language can express. They are more injurious in the main than the cotton caterpillar in our Southern States.

The Banda Oriental, on the opposite side of the Rio de la Plata, is represented to be much better suited to the culture of cotton, both by soil and climate, than most of the other regions irrigated by its waters.



CHAPTER IV.

THE COTTON STATES OF THE SOUTH.

The cotton States, *par excellence*, are South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, and Arkansas. The southern half of North Carolina and Tennessee produces good cotton; but neither of these States is included by our best planters in the list of cotton States. As, however, they both produce and manufacture largely, we think they are entitled to be included in the cotton zone of the world, if not in the first-class cotton States of the South.

The area of this entire region is about 650,000 square miles, containing over 400,000,000 acres, greater than the area of Great Britain, France, Spain, Portugal, and some of the German States, put together.

Let it be populated as densely as England, it is capable of sustaining 160,000,000 people. Populated like France, it would hold about 100,000,000. Populated as we think it should be, it will sustain, with ease and comfort, about 30,000,000.

No country on the face of the earth presents greater inducements to the laborer, the manufacturer, or the capitalist. Fifty years ago three-fourths of it was a wilderness. A traveller through the South, in the summer of 1860, might have said with propriety, "The wilderness shall

blossom like the rose." The millions of cotton blooms in myriads of fields would have suggested the passage.

As this book is intended partly for those who want information on all matters of interest to the immigrant, we propose a brief sketch of the cotton States, exhibiting the varied resources of the country, and pointing out with candor the facilities which the planter will enjoy, and the difficulties which he must expect to encounter.

Man cannot live by cotton alone. He must have food and timber and iron, coal, salt, and the fruits of vines, trees, and shrubs. Do the cotton States supply all these wants? This question we propose to answer.

We will distribute the subject under the following heads:

Section 1. Geological Features, including Mineral Productions.
" 2. Hydrography.
" 3. Climatology.
" 4. Rain Fall, Dews, and Frosts.
" 5. Productions of the Forest—Flora of the South.
" 6. Fauna of the South.
" 7. Soil of the Cotton States.
" 8. Agricultural Statistics.
" 9. Principal Diseases.

SECT. I.—GEOLOGICAL FEATURES.

The southern portion of the Gulf States, including Texas, Louisiana, Mississippi, Alabama, and Florida, is included by geologists in the alluvium and post-pliocene formations, and the eastern parts of North Carolina, South Carolina, and Georgia, along the Atlantic slope, belong to the same formation.

The average width of these deposits is about one hundred and fifty miles. Proceeding northward from the Gulf toward the State of Tennessee, we find, underlying these formations, the eocene and cretaceous in Mississippi; the eocene, cretaceous, carboniferous, and upper Silurian and granite series in Alabama; the eocene, cretaceous, carboniferous, and granite series in Georgia; the eocene, cretaceous, and granite series in South Carolina. Proceeding from east to west in North Carolina, we find the alluvium, post-pliocene, miocene, eocene, cretaceous, granite series, and, near the junction with Tennessee, the lower Silurian rocks.

The State of Tennessee is more complicated in its geology than any other. Beginning at the western boundary, we find, at the low places on the Mississippi river, the alluvium and post-pliocene extending from the northern to the southern part of the State. Proceeding eastward, we discover the eocene, underlaid successively by the Cretaceous, the Devonian, the upper Silurian, and lower Silurian, till we reach the Cumberland mountains, where the last-mentioned formation is overlaid by the carboniferous group, including the coal itself. This coal is a part of the great Appalachian coal field, which extends in a southwestern direction into northeastern Alabama.

Texas and Arkansas present substantially the same variety as Alabama.

MINERAL PRODUCTIONS OF THESE STATES.

The alluvium, post-pliocene, and cretaceous formations nowhere produce any massive or heavy minerals. The other formations bear the usual variety of minerals useful in arts and agriculture.

North Carolina has gold, iron, marble, limestone, lead, marl, and salt.

Tennessee has compact limestone, marbles in great variety, saltpetre, Epsom salts, alum, fine quartzose sand for glass, hydraulic limestone, millstone grit, roofing slate, iron, zinc, lead, copper, coal in abundance, and gold and silver in small quantities. Marl is also found in the western part of the State in the cretaceous system.

South Carolina has marl, salt, metamorphic marble, gold.

Georgia and Alabama have marl, salt, limestone, marble, coal, gold, lead, and quartzose sand.

Florida has no massive minerals, but has an abundance of clay, marl, and fine sand for glass. The same remark is applicable to Mississippi and Louisiana. There is no building limestone in any one of these three States, and the soft ferruginous sandstone is unfit for architectural purposes. Some salt has been found in Florida, and a considerable mine of it in Louisiana.

Texas has marl, salt, coal, lead, saltpetre, and limestone.

Arkansas has marl, salt, saltpetre, lead, silver, limestone and gold-bearing rocks, in which some gold has been found, roofing slate, and whetstone.

SECT. II.—HYDROGRAPHY.

We recognize in this region four water slopes: 1. The Texas slope; 2. The Mississippi slope; 3. The eastern Gulf slope; 4. The Atlantic slope.

THE TEXAS SLOPE.

The largest rivers of this system are the Rio Grande, Nueces, San Antonio, Guadalupe, Colorado, Brazos, Trinity, Neches, and Sabine.

All of these streams run separately into the western part of the Gulf of Mexico. Most of them are navigable, and small steamers are generally able to ascend to a distance of from fifty to five hundred miles.

The Mississippi slope embraces all the country watered by streams which flow into the Mississippi river, and includes the States of Arkansas, Mississippi, Louisiana, and the western part of Tennessee.

The principal streams are the Mississippi, the White, Arkansas, and Red rivers on the west of the "Father of Waters," and the Yazoo and Big Black on the east. We may also include the Pearl and Pascagoula, which, running southward through the State of Mississippi, empty into the Gulf.

The eastern Gulf slope embraces all of Alabama except the northern part through which the Tennessee river runs, all of Florida except that lying immediately on the Atlantic, and western Georgia.

The principal streams are the Tombigbee, Alabama, Appalachicola, and Suwanee.

These streams all flow in a southerly direction, and empty into the Gulf of Mexico between longitude 83° and 88° west from Greenwich.

The Atlantic slope embraces eastern Georgia, eastern Florida, all of South Carolina, and all of North Carolina except that part which lies between the Blue Ridge and the Alleghany mountains.

The principal streams are the St. Johns, Altamaha, Ogeechee, Savannah, Edisto, Santee, Great Pedee, Cape Fear, Neuse, Tar, and Roanoke.

On all these streams and their unnumbered tributaries there are valley lands of surpassing richness and fertility,

and the hill and table lands adjoining them are quite productive.

SECT. III.—CLIMATOLOGY.

The cotton States of the South are situated mostly in the zone of climate designated warm. The peninsula of Florida, a small part of Louisiana and of Texas, are included in the hot zone. The warm zone embraces the country between the isothermal lines of 70° and 60°. The mean annual temperature of five stations near the Atlantic coast is 65°, and of ten stations in the interior 63°. The climate of the interior is warmer in summer and colder in winter than that of the coast.

In comparing the climates of the cotton regions with those of other countries, it is necessary to remember how much the best cotton districts are influenced by the Atlantic or the Mexican Gulf. The climate west of the Alleghany mountains is more mild than that under the same parallels in the Atlantic States, even to the extent of three degrees of latitude.

This has been explained as caused by the warm air of the Gulf of Mexico being driven up the basin of the Mississippi and that of the Ohio. The direction of the valley north and south no doubt favors the course of the southern winds; while the regions of the Atlantic slopes, being transverse, oppose any such transmission. The majority of the places of which the mean temperatures have been adduced are on the sea-coast, and necessarily participate in the peculiarities of an insular climate; that is, of seasons moderately contrasted. Still the difference between the hottest and the coldest month of the year is much greater than at Vera Cruz—that is, than 12°; being, at Mobile, Galveston, and New Orleans, 27°.23, 29°.10, and 29°.96

respectively. But in the interior, at Natchez and Vicksburg, the differences are greater, being 32°.69 and 31°.57. In the Atlantic districts the differences are nearly as great as those on the south coast, being 31°.73 at Savannah and 31°.09 at Charleston; while in the interior the differences are much greater, being 36°.02 at Augusta and 38°.10 at Columbia.

Louisiana.—The climate of most parts of this State is somewhat variable. From the sea to Point Coupée, it seldom snows or freezes, except in the months of December and January, and then when the wind is from the north or northwest. There is less heat and more moisture than in any similar latitudes on the eastern continent, and the climate is generally very mild. In winter the thermometer seldom falls more than 2° below the freezing-point. Snow in New Orleans is a great curiosity.

Mississippi.—Near the Gulf of Mexico the climate resembles that of the lower parts of Louisiana. The winter is mild, the summer warm, but tempered by the constant prevalence of the breeze from the Gulf, together with the elevation of the surface. At Natchez, however, the thermometer in winter sometimes stands as low as 10° F. In the northern part of the State the winters are quite cold, but only by spells, ten days of cold weather being regarded as a long period. Throughout the State generally, the warm season commences about the middle of April, and continues until the middle of October. Mild weather is often protracted through the winter, and we have often seen, in and about the capital of the State, roses blooming in November.

Alabama.—In the low and southern parts of this State the heat is very great. The climate of the inland and upper parts may be considered remarkably mild. Frost commences generally in October, and continues usually to the latter part of April. During the summer there is usually a prevalence of westerly winds. Those from the southeast are regarded as the sure harbingers of rain. At Mobile, from nine in the morning till evening, the pleasant and salutary effects of the sea breeze are felt. The rich verdure of the earth, with the copious dews that fall during the night, and the elevation of the soil, which in the upland parts is from six hundred to one thousand feet above the sea, produce a beneficial effect upon the climate. The northern part of the State is quite similar in its climate to that of Mississippi.

Georgia.—The climate of Georgia resembles that of Alabama. The winter is the most pleasant season of the year, when the thermometer usually ranges from 40° to 66°, though sometimes a considerable degree of cold prevails. In the middle and southern regions snow is uncommon, but in the northern part it sometimes falls to the depth of five or six inches. The spring is usually rainy, and the summer is variable, with a temperature ranging from 75° to 95°. The atmosphere feels enlivening, being refreshed by gentle breezes from the sea-shore. About the 20th of July the summer rains set in, often accompanied with storms of thunder and severe winds, and, though not tropical in their violence, are often so heavy as to deluge the fields. Similar rains and storms are common throughout the Southern States. About the end of July or beginning of August the wind usually changes its direction from southeast to southwest. The autumn is usually fine

and clear, and frosts rarely come before the end of October. The inhabitants of the hilly tracts, two hundred miles from the coast, enjoy an agreeable climate, which is favorable to health. The cotton in these hill regions, being less exposed, is allowed to hang longer, so as to become perfectly mature. White labor, well directed, will doubtless be adequate to the production of crops two hundred miles from the coast; but in the more southern regions negro labor is, as a general thing, more profitable.

South Carolina.—The winter of the lower parts of this State is mild, and snow seldom falls near the sea. The cold weather terminates in March, when snow and heavy rains usually occur. April and May are commonly dry months. In the low country the heat of summer is intense, but the climate is liable to sudden changes of temperature, when it is damp with fogs and heavy dews. June, July, and August are usually the wettest months, and the rains consist of heavy bursts and frequent showers. November is usually fine, even after the coming of frosts, which sometimes do not occur until December. In the upper country frost appears earlier and continues later; but the weather is not so variable. In winter the cold is considerable, but does not last very long. The climate of the Santee hills, which are situated eighty or ninety miles from the coast, is similar in character.

Florida.—The climate of Florida has long been extolled as the most genial and equable on this continent, and its fame in that respect formerly attracted to the State invalids from all parts of the country. The average degree of temperature is about 73° F., and in no part of the State does the difference between summer and winter exceed

25°, while at the extremity of the peninsula the variation is not greater than 11°. That portion of the State is clothed in perpetual verdure, and the summer is only distinguished by the frequency of its showers. In many respects the climate of Florida resembles that of Cuba, but the State generally enjoys the advantage of immunity from the malarial diseases which frequently prevail in that island. The warmth and humidity of the climate of Florida are the causes of the luxuriant vegetation which distinguishes it from all the other States.

Texas.—The climate of Texas is more healthy than that of Louisiana or any of the Gulf States. The weather is dry from March to October, though sufficient rain usually falls to make good crops. The winters are warm and mild on the coast, and for some distance inland snow is seldom seen, except on the higher table-lands or mountains. From April to September, the thermometer, near the coast, usually ranges from 63° to 100°. The greatest heats, however, are tempered by strong and constant breezes, which begin to blow soon after the rising of the sun, and continue until past noon. The nights throughout the middle region are cool and refreshing during the year.

Arkansas.—The climate of Arkansas, from its southern extremity to the 35th parallel, is similar to that of Mississippi in the same degrees of latitude. The climate of the northern part of the State is similar to that of Tennessee.

Tennessee.—The climate of Tennessee is usually described as temperate, salubrious, and invigorating—neither so warm as that of the Gulf States, nor so cold as that of the northern regions. We have skated on her rivers in

winter, and sweated profusely in her cotton fields in summer. The average mean temperature of the year is about 62°.

North Carolina.—The climate of this State is similar to that of Tennessee, though, from its position east of the Alleghany mountains, it is not quite so temperate.

SECT. IV.—RAIN FALL, DEWS, AND FROSTS.

The entire territory of the Southern States belongs to the region of frequent rains; and, although there are frequent droughts, as in all other parts of the United States, the rain is as equally distributed through the different seasons, and falls in as great quantity, as in any other region of the globe lying in the warm zone.

The following table shows the comparative fall of rain in the Northern and Southern Atlantic States:

FALL OF RAIN IN INCHES.

STATIONS.	Spring.	Summer.	Autumn.	Winter.	Year.
Northern Atlantic Slope.					
Eastport	8.88	10.05	9.85	10.61	39.39
Providence (average 23 years)					39.71
Albany (average 20 years)					40.
New York	11.55	11.33	10.30	9.63	42.23
Philadelphia (average 28 years)					42.33
Baltimore	11.13	11.04	10.52	9.31	42.
Washington	10.45	10.53	10.15	10.07	41.20
Southern Atlantic Slope and Gulf States.					
Charleston	9.89	17.45	10.06	7.52	44.92
Savannah (average 9 years)					49.43
St. Augustine	5.90	10.54	9.56	5.80	31.80
Pensacola	12.86	18.69	13.71	11.72	56.98
New Orleans	11.29	17.28	9.62	12.71	50.90
Baton Rouge	15.08	19.14	12.48	15.40	62.10

We have no regular wet and dry seasons, no period-

ical rains, as on the Pacific slope, but they are irregularly distributed throughout all the seasons of the year.

Dews.—In the dry periods of summer and autumn a compensation for the want of rain is made by the copious dews. During the day the earth receives an immense amount of heat from the sun. At sunset it begins the work of radiation, and carries it on rapidly during the night until it becomes a vast condenser, receiving, in literal showers, moisture from the atmosphere which refreshes all vegetation. The cotton fields rejoice, and the heart of the planter is gladdened.

Frosts.—The season of frosts and freezing weather, in the larger part of the cotton region, begins about the middle of October, and terminates about the middle of March. Our agricultural period embraces seven months, but it is deemed prudent to defer the planting of cotton until about the middle of April, allowing full time for the earth to become thoroughly warm, and giving six months for the planting, cultivation, and maturing of the crop.

Cotton is a plant of the sun, and requires his genial rays for half the year. It is for this reason that we confidently predict that all experiments north of the 36th parallel of latitude—isothermal of 60°—will fail.

We advise Illinois farmers to let cotton alone, and to give their attention to stock and grain.

SECT. V.—PRODUCTIONS OF THE FOREST—FLORA OF THE SOUTH.

We are indebted to Wailes's "Report on the Agriculture and Geology of Mississippi" for the following catalogue of trees, shrubs, herbs, and flowers. The flora of the other States does not differ materially from that of Mississippi.

I. FOREST TREES.

POPULAR NAME.	SCIENTIFIC NAME.
Apple, crab	Pyrus coronaria.
Ash, blue	Fraxinus quadrangulata.
" white	" acuminata.
Beech,	Fagus Americana.
Barberry,	Berberis vulgaris.
Birch,	Betula populifolia.
Bay, sweet	Magnolia glauca.
Bayberry,	Myrica cerifera.
Box elder,	Acer negundo.
Buckeye, dwarf	Æsculus pavia.
" "	" spicata.
Candleberry,	Myrica cerifera.
Cherry,	Cerasus Virginiana.
Cucumber tree,	Magnolia auriculata.
Chestnut,	Castanea vesca.
Chinquepin,	" pumila.
Cottonwood,	Populus deltoides.
Cypress,	Cupressus disticha.
Cedar,	Juniperus Virginiana.
Dogwood,	Cornus florida.
" swamp	" sericea.
" "	Cephalanthus occidentalis.
Elm, red	Ulmus Americana.
" slippery	" fulva.
" cork-bark	" racemosa.
Elder,	Sambucus Canadensis.
Gum, sweet	Liquidambar styraciflua.
" black	Nyssa multiflora.
Haw, black	Viburnum prunifolium.
" possum	" nudum.
Hackberry,	Celtis occidentalis.
Hickory,	Carya tomentosa.
Hazel,	Corylus Americana.
Hazel, witch	Hamamelis Virginica.

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POPULAR NAME.	SCIENTIFIC NAME.
Holly,	Ilex opaca.
Hawthorn,	Cratægus crus-galli.
"	" punctata.
" parsley-leaved	" apiifolia.
Hornbeam,	Carpinus Americana.
Honeysuckle,	Azalea rubra.
" white	" viscosa.
Huckleberry,	Vaccinium corymbosum.
" swamp	" vacillans.
Hydrangea,	Hydrangea arborescens.
Hercules' club,	Aralia spinosa.
Ironwood,	Ostrya Virginica.
Lauria mundi,	Cerasus Carolinensis.
Laurel,	Cerasus lauro.
" swamp	Kalmia glauca.
Linn,	Tilia Americana.
Leatherwood,	Dirca palustris.
Locust,	Robinia pseud-acacia.
Locust, honey	Gleditschia triacanthos.
" "	" brachyloba.
Magnolia,	Magnolia grandiflora.
"	" auriculata.
Maple, sugar.	Acer saccharinum.
" red	" rubrum.
" silver-leaved	" dasycarpum.
" swamp	" negundo.
Mulberry,	Morus rubra.
Myrtle,	Myrica inodorata.
" wax	" cerifera.
Oak, live	Quercus virens.
" red	" rubra.
" black	" tinctoria.
" blackjack	" nigra.
" white	" alba.
" Spanish	" falcata.
" post	" obtusiloba.

POPULAR NAME.	SCIENTIFIC NAME.
Oak, chestnut	Quercus castanea.
" chinquepin	" prinoides.
" overcup	" macrocarpa.
" swamp	" aquatica.
" willow	" phellos.
" pin	" palustris.
Osage orange,	Maclura aurantiaca.
Pride of Barbadoes,	Amorpha fruticosa.
Pecan,	Carya olivæformis.
Pecan, bitter	Hicorea Texana.
Pig-nut,	Carya amara.
Plum,	Prunus Americana.
"	" Chickasaw.
" blue	" ———?
" red	" ———?
" "	" ———?
Prickly ash,	Xanthoxylum tricarpum.
Pawpaw,	Uvaria triloba.
Pine, long-leaf	Pinus palustris.
" short-leaf	" ~~rigida~~. mitis
" swamp	" ~~mitis~~. Tæda
" pitch	" ~~tæda~~. ?
Poplar,	Liriodendron tulipifera.
Persimmon,	Diospyros Virginiana.
Redbud, *Judas-tree*,	Cercis Canadensis.
Sycamore,	Platanus occidentalis.
Sumac,	Rhus glabra.
" dwarf	" typhina.
Strawberry tree,	Euonymus Americanus.
Swamp spice,	Ilex prinoides.
" snow-ball,	Hydrangea quercifolia.
Sassafras,	Laurus sassafras.
Shellbark,	Carya alba.
Starry annis,	~~Kalmia glauca~~. Illicium floridanum
Spanish mulberry,	Callicarpa Americana.
Service-tree,	Aronia arbutifolia.

POPULAR NAME.	SCIENTIFIC NAME.
Stewartia,	Stewartia malacodendron.
Spice wood,	Laurus benzoin.
Tupelo,	Nyssa villosa.
" large-fruited	" tomentosa.
Toothache tree,	Xanthoxylum clava Herculis.
Umbrella tree,	Magnolia tripetala.
Walnut, black	Juglans nigra.
Willow,	Salix nigra.

II. PARASITES, RUNNERS, AND CLIMBERS.

Blackberry,	Rubus villosa.
" swamp	" hispidus.
Creeper,	Bignonia radicans.
Cross vine,	" ~~crucigera~~. capreolata
Cornucopia,	Glycine fructescens?
Coral vine,	Lycium Europæum?
Dewberry,	Rubus Canadensis.
Green moss,	~~Tillandsia~~? Usnea
Jasmine, yellow	Gelsemium nitidum.
Mistletoe,	Viscum verticillatum.
Poison oak,	Rhus toxicodendron.
Passion flower,	Passiflora incarnata.
Spanish moss,	Tillandsia usneoides.
Supplejack,	Zizyphus volubilis.
Strawberry,	Fragaria Virginiana.
Sensitive brier,	Mimosa instia.
Sarsaparilla vine,	Schizandra coccinea.
Tie vine, *Morning-glory*,	Convolvulus arvensis.
Wild potato vine,	" panduratus.
Woodbine, red	Lonicera sempervirens.
" yellow	" flava.

III. UNDERGROWTH PERENNIALS.

Bear grass,	Yucca filamentosa.
Cane,	Arundo gigantea.

POPULAR NAME.	SCIENTIFIC NAME.
China brier,	Smilax China.
Fern,	Polypodium ——— ?
"	" ——— ?
Green brier,	Smilax rotundifolia.
" "	" spinulosa.
Palmetto, fan	Sabal minor.
Prickly pear,	Opuntia vulgaris.
Reed,	Arundo tecta.

IV. NOXIOUS WEEDS, HURTFUL TO PLANTATIONS.

Burdock,	Lappago major.
Beggarsticks,	Bidens connata.
Cocklebur,	Xanthium strumarium.
Dock,	Rumex obtusifolia.
Dog fennel,	Anthemis cotula.
Jamestown weed,	Datura stramonium.
Sneeze weed,	Helenium autumnale.
Stinging nettle,	Urtica urens.
Spanish needles,	Bidens bipinnata.
Smart weed,	Polygonum articulatum.
Thistle,	Cirsium lanceolatum.
"	" pumilum.
Wild coffee weed,	Cassia occidentalis.
" chamomile,	Anthemis arvensis.

V. VITUS, OR GRAPE.

Muscadine,	Vitis rotundifolia.
Choke grape,	" cordifolia.
Small sour grape,	" ——— ? riparia.

VI. PLANTS, USEFUL, MEDICINAL, AND ORNAMENTAL.

Aster,	Aster radula.
Boneset,	Eupatorium perfoliatum.
Columbo,	Frasera Walteri.

POPULAR NAME.	SCIENTIFIC NAME.
Chickweed,	Stellaria media.
Cotton rose,	Hibiscus grandiflorus.
Calamus,	Acorus calamus.
Cat's-tail,	Typha latifolia.
Centaury plant,	Sabbatia angularis.
False foxglove,	Gerardia flava.
Ginger, wild	Asarum Canadense.
Green dragon,	Arisæma dracontium.
Gall of the earth,	Nabalus Fraseri.
Ground ivy,	Epigæa repens.
Horsemint,	Monarda fistulosa.
Hoarhound,	Marrubium vulgare.
Heartsease,	Viola tricolor.
Indian turnip,	Arisæma triphyllum.
Jerusalem oak,	Ambrina anthelmintica.
" cherry,	Physalis viscosa.
Lucern,	Medicago sativa.
Lambsquarter,	Chenopodium album.
Lobelia,	Lobelia cardinalis.
Milk-weed,	Acerates viridiflora.
May apple,	Podophyllum peltatum.
Monoca nut,	Nelumbium speciosum.
Mallow,	Hibiscus militaris.
Mullein,	Verbascum thapsus.
Pleurisy root,	Asclepias tuberosa.
Pink-root,	Spigelia Marylandica.
Puccoon, *Bloodroot*,	Sanguinaria Canadensis.
Purslane,	Portulaca oleracea.
Poke-weed,	Phytolacca decandra.
Pine-sap,	Monotropa hypopitys.
Pickerel-weed,	Pontedera cordata.
Pansy,	Viola tricolor.
Peppermint,	Mentha piperita.
Partridge pea,	Lathyrus variosus.
Rattlesnake master,	Hieracium venosum.
Rush,	Equisetum hyemale.

POPULAR NAME.	SCIENTIFIC NAME.
Silk-weed,	Asclepias purpurascens.
" "	" variegata.
Sorrel,	Oxalis stricta.
Senna, wild	Cassia Marylandica.
Pepper-grass,	Lepidium campestre.
Specularia,	Specularia perfoliata.
Violet,	Viola rotundifolia.
White water-lily,	Nymphæa odorata.
White clover,	Trifolium repens.
Wild indigo,	Baptisia tinctoria.
" sensitive plant,	Cassia nictitans.
" parsnip,	Pastinaca sativa.
Water plantain,	Alisma plantago.
Wild senna,	Cassia Marylandica.
Vinnella,	Cacalia suaveolens.
Viburnum,	Verbena spuria.
Yellow pond-lily,	Nuphar advena.
Vervain,	Verbena spuria.
Trailing arbutus,	Epigæa repens.
Bear's-foot,	Helleborus fœtidus.

LIBRARY

REMARKS.—Of our timber and timber trees much of interest might be said, did our space admit of it.

The cypress, for many purposes of building, stands unrivalled. I have no means of estimating the value of the trade in this timber, but it is immense.

There is scarcely a town or village on the Mississippi or its tributaries, within the limits of the State, in which there is not one or more steam-mills busily employed in sawing this timber. Add to these the numerous mills similarly employed on plantations, and take into view the logs rafted to New Orleans, and along the river coast below our borders, and it will be perceived that the annual consumption of this valuable timber, the growth of our swamps, is enormous.

Next in value to the cypress, and perhaps more inexhaustible, is the long-leaf pine, which is taken to the mills along the seaboard, or shipped in logs to Europe or the West Indies.

Suitable sticks for masts or spars in ship-building are greatly in demand at very lucrative prices, and a great quantity of this description of timber is purchased for the French navy.

In the counties bordering on the sea-shore, the pine is made to afford a considerable supply of tar and charcoal, much of which is taken across the lake to New Orleans.

The long-leaf pine is not found in any quantity north of the 31st degree, but the short-leaf pine extends to Tennessee.

The live oak is highly prized as an ornamental shade tree, but does not now exist on our coast in such abundance as to furnish any considerable supply of timber for ship-building. It is not found north of the 31st degree.

The geographical distribution of some of our forest trees seems to be well defined. For example, the *Magnolia tripetala* (umbrella tree), as a prevailing growth, seems to be confined to a narrow belt extending northwardly from our southern boundary, in a direction parallel with the general course of the Mississippi river, and twelve or fifteen miles to the east of it.

I have not met with it north of the 33d degree of north latitude, which seems also to be about the northern limit of the Spanish moss, *Tillandsia usneoides.*

Over extensive districts of country a single species of timber sometimes is found to prevail almost exclusively, with the exception of the inferior shrubs and plants that constitute the undergrowth. This is the case, mainly, with the long and short-leaf pine, which, though sometimes

blended, occupy generally distinct tracts; and also with the post-oak and black-jack. The same may be said, but to less extent, of the hickory and the chestnut.

Other tracts exhibit a remarkable variety of the forest-trees in close association, which generally affect distinct soils and situations. This was noticed as forming a remark able feature of the forests in the eastern part of Wilkinson county, and in part of Amite.

The evergreens and deciduous trees are seen intermingled, and forming varied and pleasing contrasts. Indeed, it was often difficult to detect on quite limited areas the absence of any of our forest trees.

The sweet-gum was formerly regarded as a useless cumberer of the earth, and, from its great size on the rich alluvial lands, difficult to be got rid of except by the slow process of deadening, by *belting* or cutting around the tree through the sap. Of late years, it has come into considerable use as a fuel on steamboats, and, when seasoned, little difficulty is experienced in burning it.

The sassafras, a valuable timber tree, and formerly abundant, and in great demand in past years for shingles where the cypress was less convenient, has in consequence been greatly diminished, but large trees of it are still found in many portions of the State.

The linn has also become scarce in many situations where it was formerly very abundant. In early times the bark was very useful in manufacturing ropes, and for other purposes, and this was one of the early causes of its destruction. It is a soft-grained wood, of even texture, free from knots and other imperfections, and not liable to shrink or warp when seasoned, and therefore very suitable for ceilings and other interior parts in buildings.

Bees are very fond of the flowers, and the honey made

from them is reputed to possses a peculiarly delicate flavor. That from the flowers of the chinquepin, on the contrary, is said to be poisonous.

The linn appears to be most abundant, at this time, in the western part of Jefferson county.

The cottonwood, *Populus deltoides*, now the chief resource for steamboat fuel on the lower Mississippi—the ash timber having become nearly exhausted at all accessible points—is of very quick growth, and the rapidity with which it is reproduced is consequently a very favorable circumstance. Every new deposit made by the inundations of the river is speedily covered with a spontaneous growth of young cottonwood, standing as thickly as a crop of small grain. This arrests the sediment subsequently brought by the river, and new islands and bars are formed, upon which the growth, by a natural process becoming sufficiently thinned out, attains a considerable size in a very few years, thus renewing the supply of fuel, which otherwise would speedily become exhausted.

The chestnut is only found in the interior, and most abundantly in the northern counties. The tree seems to have become diseased in latter years, and is rapidly dying out.

EDIBLE FRUITS.

The *peach* grows to perfection and in great variety.

The *pear* has been cultivated with success, and many varieties are found in our yards and gardens.

The *apple* is raised on all our plantations, but not to such perfection as in the North.

Figs are found from the southern extremity of Florida to the 33d parallel.

Orange groves and orchards may be seen in Texas,

Louisiana, and Florida, and along the Gulf in Mississippi and Alabama.

The *damson plum* attains the size of a pullet's egg, and the *nectarine* (the furzeless peach) is grown by many of our orchardists.

Grapes are cultivated with remarkable success, and wines have been made here which will stand a good comparison with the pure juices of Nicholas Longworth.

Watermelons, *muskmelons*, *cantelopes*, and *nutmeg-melons* grow in rich abundance, while in size and flavor they surpass those of a more northern climate.

Pumpkins reach a development fully equal to those which made the mouth of "Ichabod Crane" water; and *squashes*, *cymlings*, and *cucumbers* lie in profusion in our gardens during their season.

We have luscious raspberries and mammoth strawberries, not surpassed by Peabody's best.

Edible Roots.—Turnips and Irish potatoes do well; and yams grow larger than a boy's thigh. The weight of a big yam is from 8 lbs. to 12 lbs. Beets, radishes, &c., all grow with trifling care.

SECT. VI.—FAUNA OF THE SOUTH.

We propose a brief notice of the vertebrated animals both of the land and water, and likewise a sketch of the insects, both those which are beneficial and those which are injurious to vegetation.

All vertebrated animals are distributed into four classes:

1st. Mammals, or milk-giving animals.

2d. Birds.

3d. Reptiles.

4th. Fishes.

Among the mammals we may notice the

POPULAR NAME.	SCIENTIFIC NAME.
American deer,	Cervus Virginianus.
Black bear,	Ursus Americanus.
Raccoon,	Procyon lotor.
American wolf,	Lupus occidentalis.
Black wolf,	Canis lupus.
Gray fox,	Vulpes Virginianus.
Northern panther,	Felis concolor.
Wild-cat,	Lyncus rufus.
Beaver,	Castor fiber.
Musk-rat,	Fiber zibethicus.
Gray squirrel,	Sciurus lucatis.
Red fox-squirrel,	" capistratus.
Black "	" niger.
Ground "	" striatus.
Flying "	Pteromys volucella.
Otter,	Lutra Canadensis.
Shrew mole,	Scalops aquaticus.
American opossum,	Didelphus Virginianus.
Leather-winged bat,	Vespertilio Noveboracensis.
Common rat,	Mus decumanus.
Large wood rat,	——— ———.
Cotton rat,	Sigmodon hispidum.
Common mouse,	Mus musculus.
Wood mouse,	Arvicola.
Common gray rabbit,	Lepus nanus.
American gray "	" Americanus.
Cane or wood "	" aquaticus.

BIRDS.

Natatores—Swimmers.

Mallard,	Anas boschas.
Wood duck,	" sponsa.
Sprig-tailed duck,	' acuta.
Gray duck,	" strepera.
Blue-winged teal,	" discors.

POPULAR NAME,	SCIENTIFIC NAME.
Green-winged teal,	Anas Carolinensis.
Spoon-bill duck,	" clypeata.
Diedipper "	Fuligula albeola.
Red-head "	" erythrocephala.
Wild goose,	Anser Canadensis.
Brant,	" bernicla.
Water witch,	Podiceps cristatus.
Great loon,	Colymbus glacialis.
Petrel,	Thalasidroma Wilsonii.
Cormorant,	Phalacrocorax Brasilensis.
White pelican,	Pelicanus trachyrhynchus.
Gannet, or frigate bird,	Tachypetes aquilus.
Cut-water,	Rhynchops nigra.
Marsh tern,	Sterna Anglica.
Common gull,	Larus zonorhynchus.

Grallæ — Waders.

American ring plover,	Charadrius semipalmatus.
Piping plover,	" melodus.
Wilson's "	" Wilsonius.
Killdeer "	" vociferus.
Whistling "	Squatarola Helvetica.
Whooping crane,	Grus Americana.
Great blue heron,	Ardea Herodias.
Great white "	" leuce.
White-crested "	" candidissima.
Blue "	" cerulea.
Green "	" virescens.
Bittern,	" exilis.
Indian hen,	" minor.
Roseate spoonbill,	Platalea ajaja.
White ibis,	Ibis alba.
Glossy "	" Mexicana.
Spanish curlew,	Numenius longirostris.
Gray plover,	Totanus Bartramius.

POPULAR NAME.	SCIENTIFIC NAME.
American snipe,	Scolopax Wilsonii.
Woodcock,	Rusticola minor.
Rail,	Ortygomotra Carolinensis.
Coot,	Fulica Americana.

Rasores—Scratchers.

Wild turkey,	Meleagris galliparvo.
Partridge, or quail.	Ortyx Virginiana.

Scansores—Climbers.

Crested woodpecker,	Picus pileatus.
Red-headed "	" erythrocephalus.
Yellow-bellied "	" varius.
Downy "	" rubescens.
Golden-winged "	" aurantus.
Ivory-bill "	" principalis.
American cuckoo,	Coccyzus Americanus.
Paroquet, Carolina parrot,	Psiticus Carolinensis.

Insessores—Perchers.

House martin,	Hirundo purpurea.
Barn swallow,	" rufa.
Chimney swallow,	Acanthylis Pelasgia.
Whippoorwill,	Caprimulgus vociferus.
Chuckwill's widow,	" "
King-fisher,	Alcedo alcyon.
Humming-bird,	Trochilus colubris.
House wren,	Troglodytes aëdon.
American robin,	Merula migratoria.
Cedar-bird,	Bombycilla Carolinensis.
Blue-bird,	Sialia Wilsonii.
Mocking-bird,	Orpheus polyglottus.
Brown thrush,	" rufus.
King-bird, or bee martin,	Tyrannus intrepidus.

POPULAR NAME.	SCIENTIFIC NAME.
Blue jay,	Garrulus cristatus.
Common crow,	Corvus Americanus.
Crow blackbird,	Quiscalus versicolor.
Meadow lark,	Sturnella Ludoviciana.
Golden oriole,	Jeterus Baltimore.
Red-winged oriole,	" Phœniceus.
Red-winged starling,	Sturnus prædatorius.
Crested red-bird,	Pitylus cardinalis.
Red-bird,	Pyranga æstiva.

Raptores—Birds of Prey.

VULTURE FAMILY.

Turkey buzzard,	Cathartes aura.
Carrion crow,	" atratus.

FALCON FAMILY.

Bald or brown eagle,	Haliatus lucocephalus.
Red-tailed hawk,	Butes borealis.
Chicken "	Falco anatum.
Swallow-tailed hawk,	Nauclerus furcatus.
Sparrow hawk,	Falco sparverius.

OWL FAMILY.

Great horned owl,	Bubo Virginianus.
Screech-owl,	" asio.
Short-eared owl,	Otus palustris.
Barred owl,	Ulula nebulosa.

REPTILES.

Turtle Family.

Soft-shelled turtle,	Trionyx ferox.
Loggerhead turtle,	Chelonura Temmincki.
Snapping turtle,	" serpentina.

POPULAR NAME.	SCIENTIFIC NAME.
Green turtle,	Chelonura mydas.
Hawk-bill turtle,	" caretta.
Mud turtle,	Kinosternon Pennsylvanicum.
Terrapin,	Cistuda Carolina.
Gopher,	Testudo polyphæmus.

Lizard Family.

Alligator,	Alligator Mississippiensis.
Chameleon,	Anolis Carolinensis.
Gray lizard,	Tropidolepis undulatus.
Striped lizard,	Cnemidophorus sexlineatus.
Red-headed lizard,	Ligosoma quinquelineatus.

Batrachian Family.

Ground puppy,	Salamandra, seven species.
Water lizard,	Siren lacertina.
Bull-frog,	Rana pipiens.
Spring frog,	" fontanalis.
Wood frog,	" sylvatica.
Leopard frog,	Hyla halecina.
Tree toad,	" viridis.
Common toad,	Buffo Americanus.

Snake Family.

The following catalogue of our snakes was made by Professor Baird, of the Smithsonian Institution, and described in his work on the Serpents of North America:

OPHIDIA.

Crotalidæ.

Banded rattlesnake,	Crotalus durissus.
Ground rattlesnake,	Crotalophorus milarius.
Copperhead,	Agkistrodon contortrix.

POPULAR NAME.	SCIENTIFIC NAME.
Water moccason,	Toxicophis piscivorus.
Upland moccason, Highland moccason, Cotton-mouth,	Toxicophis atrofuscus.

Elapsoidea.

Harlequin snake, Bead snake,	Elaps fulvius.
" "	Elaps tristis.

Coluberidæ.

Swift garter-snake,	Eutænia saurita?
Striped snake,	" sirtalis.
Water snake,	Nerodia Holbrookii?
Blowing viper, Hog-nose snake,	Heterodon platyrhinos.
Spreading adder,	" niger.
Hog-nose viper,	" simus.
Black pilot snake,	Scotophis guttatus.
Chicken snake, Milk snake, Cow snake,	Ophibolus clericus.
Egg snake, King snake,	" Sayi.
Common black snake,	Bascanion constrictor.
Coach-whip snake,	Masticophis flagelliformis.
Green snake,	Leptophis æstivus.
" "	Chlorosoma vernalis.
Ring-necked snake,	Diadophis punctatus.
Scarlet snake,	Rhinostoma coccinea.
Brown snake,	Haldea striatula.
Worm snake,	Celuta amœna.
" "	Tantilla coronata.
Ring snake,	Osceola elapsoidea.

The following catalogue of the fishes of the Southwest, prepared by Professor Agassiz, is regarded as an exhaustive classification:

PLACOIDS.

Rajæ.

POPULAR NAME.	SCIENTIFIC NAME.
Sting-ray,	Trygon Sabina. *Les.*
Saw-fish,	Pristis pectinatus. *Lath.*

GANOIDS.

Sturiones.

Shovelnose sturgeon,	Scaphirhynchus platirhynchus.
Spoonbill sturgeon,	Polyodon folium. *Lac.*

Sauroids.

Alligator gar,	Lepidosteus spatula. *Lac.*
Pike gar,	" ———*
Black gar,	" Chasei. *Wailes.*

Cœlacanths.

Mud-fish,	Amia calva.

Ostraciontes.

Cow-fish,	Ostracion ———*

Gymnodontes.

———,	Diodon maculato-striatus. *Mitch.*

Siluroids.

Cat-fish, salt water,	Galeichthys marinus. *Cuv.*
" "	Arius Milberti. *Cuv.*
" fresh water,	Pimelodus cœrulescens. *Raf.*
" "	" limosus. *Raf.*

* Species not yet identified.

CTENOIDS.

Pleuronectidæ.

POPULAR NAME.	SCIENTIFIC NAME.
———,	Achirus mollis. *Mitch.*

Chætodonts.

Angel-fish,	Ephippus faber. *Blo.*
———,	Chætodon striatus. *Lin.*

Sparoids.

Sheepshead,	Sargus ovis. *Mitch.*
Pine perch,	" rhomboides. *Cuv.*

Sciænoids.

Trout,	Otolithus Carolinensis. *Cuv.*
"	" Drummondi. *Rich.*
Red-fish,	Corvina ocellata. *Cuv.*
Whiting,	Umbrina alburnus. *Cuv.*
Big drum,	Pogonias chromis. *Lac.*
Young drum,	" fasciatus. *Lac.*
White perch,	Amblodon ———.*
Croaker, or grunt,	Micropogon undulatus. *Cuv.*

Percoids.

Striped bass,	Labrax ———.*
Rockfish,	" lineatus. *Cuv.*
Red snapper,	Serranus erythrogaster. *De K.*
Snapper,	" ———.*
———,	Diploprion fascicularis. *Hol.*
———,	Mesoprion uninotatus. *Cuv.*
Yellow-tail.	" chrysurus. *Cuv.*
———,	Centropristis trifurca. *Cuv.*

* Species not yet identified.

POPULAR NAME.	SCIENTIFIC NAME.
Goggle-eye,	Calliurus gulosus. *Ag.*
———,	Pomotis incisor. *Val.*
———,	" hæmatodes. *Ag.*
———,	" atrorubens. *Ag.*

Mugiloids.

Jumping mullet,	Mugil Plumieri. *Cuv.*

CYCLOIDS.

Sphyrænoids.

———,	Sphyræna Barracuda. *Cuv.*

Scomberoids.

Spotted mackerel,	Cybium maculatum. *Cuv.*
Pilot-fish,	Naucrates ductor. *Cuv.*
Pompeno,	Lichia Carolina.
———,	Caranx ———.*
———,	Argyrius vomer. *Lac.*
Silver-fish,	Vomer Brownii. *Cuv.*
———,	Elacate Atlantica. *Cuv.*

Scomberesoces.

Bill-fish,	Belone Caribæa. *Let.*

Esoces.

Pike,	Esox ———.*

Lophioids.

Toad-fish,	Malthea vespertilio. *Cuv.*

* Species not yet identified.

Labroids.

POPULAR NAME.	SCIENTIFIC NAME.
———,	Lachnolæmus aigula. *Cuv.*

Cyprinoids.

Gaspærgoo,	Ichthyobus ———.*
Buffalo,	Carpiodes ———.*
Sucker,	Catostomus ———.*

Cyprinodonts.

Top-water,	Zygonectes olivaceus. *Ag.*
———,	Cyprinodon ovinus. *Val.*
Minnow,	Fundulus spilotus. *Hol.*
———,	Heterandria Holbrookii. *Ag.*

Scopelini.

———,	Saurus Mexicanus. *Cuv.*

Clupeoids.

———,	Clupea ———.*
Tarpon, or Big-scale,	Megalops cyprinoides. *Lam.*

Anguillidæ.

Eel,	Anguilla ———.*

INSECTS.

We have in the South representatives of the seven orders of the insect world, viz.:

1. Beetles (*Coleoptera*); 2. Bugs (*Hemiptera*); 3. Straight-winged insects (*Orthoptera*); 4. Butterflies and moths (*Lepidoptera*); 5. Net-winged insects (*Neuroptera*);

* Species not yet identified.

6. Vein-winged insects (*Hymenoptera*); 7. Two-winged insects (*Diptera*).

A brief notice of some of the more prominent of these orders is all that we can attempt in a work of this kind.

Order 1. *Beetles.*—A practical classification arranges beetles in three families. 1. Carnivorous beetles, which prey upon living insects. 2. Scavenger beetles, which live on putrid matter, decayed wood, and plants. 3. Herbivorous beetles, which feed on plants and fruits.

The first two are useful, but the third are noxious, destructive to vegetation, injuring the planter, reducing his profits, and exerting a decided influence on the commerce of the world and the comfort of the human family. Among the carnivorous beetles we may mention two or three species of tiger beetles (*Cicindelæ*); the southern lady-bird (*Cocinella australis*); caterpillar-hunters (*Calosomæ*), which are found in our corn and cotton fields, filling the office which Nature has assigned them—devouring the insects which injure vegetation.

Among the scavenger beetles we notice the tumble-bug (*Atuchus volvens*), a cosmopolite of great notoriety; the horned passalus (*Passalus cornutus*) and the stag-beetle (*Lucanus dama*), both with pincer-like jaws; and the fox-like cetonia (*Amphicoura vulpina*).

These scavenger beetles deposit their eggs usually in rotten wood, sometimes in the ground, and the grubs or *larvæ* live for years as such before their metamorphosis into perfect beetles. Upon their emergence into the perfect state they commence their labors, and work most diligently till arrested by cold weather. They purify the atmosphere by feeding on putrid substances and the excrements of animals.

Herbivorous beetles have a horny skin and hard wing-

covers. They feed on vegetable substances not only in their perfect state, but when they are grubs. In this list we place the spring beetles (*Elater*), several species; capricorn beetles (*Crambicinæ*); snout beetles (*Curculiones*), including the wheat weevil, rice weevil, and pea weevil; and the leaf-eaters (*Chrysomilinæ*).

Order 2. *Bugs.*—Bugs do not generally undergo metamorphosis, like beetles. They come forth from their eggs in a perfect condition, with six legs and a proboscis, having no wings. The *Cicadæ* form the only exception to this rule.

In this order we may enumerate the squash bug (*Coreus tristis*), which sucks with its snout the sap of the squash and potato plants, and makes its winter quarters in the crevices of houses and under the bark of trees; tree-hoppers (*Membracis*), which feed on the leaves of the oak, the hickory, the locust, and the poplar; plant lice (*Aphis*), infesting trees, bushes, and herbs; shield lice (*Coccus*), which suck the sap of fruit trees.

Order 3. *Straight-winged Insects.*—We include among these the grasshopper, walking-leaves, crickets, cockroaches, earwigs, soothsayers, walking-sticks, etc., all of which are found in great variety and abundance.

Order 4. *Butterflies and Moths* are found in great variety. The useful silkworm can be raised with less care than in the North. We have seen the *Cecropia*, the *Polypheme*, the *Luna*, and the *Promethea*, forming their cocoons upon the leaves of our forest trees, as well as upon the trees of the orchards, inviting, as it were, the attention of man. We have the millers, the tent-caterpillars, the spaw-worm, the canker-worm, the apple-worm, all of which are more or less injurious. We are troubled also with the bee-moth, the grain-worm, the carpet-moth, and the hawk-

moths. We enroll on the list beautiful and harmless butterflies, with all their classic names—Priam, Hector, Ulysses, Ajax, Apollo, Iris, Io, Achilles, Nestor, Menelaus, Paris, Anchises, Helena, Remus, Æneas, Atalanta, and Argus.

Butterflies are harmless, from the fact that they have no mouths to eat with, but simply a proboscis, by which they suck the juices of flowers.

Order 5. *Net-winged Insects.*—All of the insects of this order are useful to man, and deserve our protecting care. We mention among the number the dragon-fly (*Libellula*), ever on the wing, hovering over fields, brooks, and ponds, greedily devouring gnats, mosquitoes, caterpillars, and flies of every description; the horned corydalis (*Corydalis cornutus*), and the day-fly (*Ephemera vulgata*).

Order 6. *Vein-winged Insects.*—These are the busy laborers, "gathering honey all the day," and distributing the pollen of flowers to render them productive; or destroying noxious insects as food for themselves and their young ones.

We notice the gall-wasp (*Cynips*), which forms the oak ball; the gold wasp (*Chrysis*); the mud-wasp (*Sphex Pennsylvanica*), which lives in the sand, and destroys spiders and cockroaches; the hornet (*Vesper chartaria*); the ants (*Formica*); and the honey-bee (*Apis mellifera*).

Order 7. *Two-winged Insects, or Flies.*—We include in this list the various gadflies which annoy horses, oxen, and sheep; the house-fly (*Musca domestica*); the meat-fly (*Musca vomitoria*); the Hessian fly (*Cecidomyia destructor*); the flea (*Pulex irritans*); and the mosquito (*Culex*).

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SECT. VII.—THE SOIL OF THE COTTON STATES.

Soils may be arranged in the following classes:

1. *Clay soils*, consisting of silex, alumina, and oxide of iron.

2. *Loamy soil*, consisting of about equal parts of sand and clay, with more or less oxide of iron.

3. *Sandy soil*, consisting of an excess of sand, with about ten per cent. of clay.

4. *Marly soils*, containing loam and from 5 to 20 per cent. of lime.

5. *Calcareous soils*, which exhibit loamy and silicious matter, mingled with lime, varying from 20 to 40 per cent.

6. *Vegetable moulds*, presenting, upon examination, clayey, loamy, or sandy matter, mixed with about 10 per cent. of vegetable matter.

The following directions for examining soils are taken from Johnston's "Agricultural Chemistry":

1. Weigh 100 grains of the soil, spread them in a thin layer upon white paper, and place them for some hours in an oven or other hot place, the heat of which may be raised till it only does not discolor the paper. The loss is water.

2. Let it now (after drying and weighing) be burned over the fire as above described. The second loss is organic, chiefly vegetable matter, with a little water which still remained in the soil after drying.

3. After being thus burned, let it be put into half a pint of water with half a wineglassful of spirit of salt, and frequently stirred. When minute bubbles of air cease to rise from the soil on settling, this process may be considered as at an end. The loss by this treatment will be a little more than the true percentage of lime.

4. A fresh portion of the soil (say 200 grains), in its moist state, may now be taken and washed, to determine the quantity of silicious sand it contains. If the residual sand be supposed to contain calcareous matter, its amount may be readily determined by treating the dried sand with diluted muriatic acid, in the same way as when determining the whole amount of lime contained in the unwashed soil.

We have in the South all these varieties of soil; and in order to determine what kind of soil is best adapted to the culture of cotton, the following general principles must be understood: 1. A soil suitable for the production of any given vegetable, whether grain or fruit, must contain all the inorganic constituents which the plant requires, and none that can do it any injury.

2. A defective soil can be fertilized only by the addition of a manure containing the substance or substances which were originally wanting.

With these explanations we present the following analyses of cotton soils, and of the ash of the cotton plant, by Charles T. Jackson, M.D., of Boston:

ANALYSES OF COTTON-PRODUCING SOILS.

No. 1.

Soil from St. Simon's Island, Georgia, on which the Sea Island or Long-staple Cotton is grown.

This soil consists of a gray sand, mixed with a fine loam, containing black particles. One thousand grains of it yield to boiling distilled water $1\frac{3}{6}$ grains of soluble matter, $1\frac{1}{10}$ grains of which consist of vegetable organic matter, and half a grain of mineral salts, consisting of chloride

of sodium, phosphates of lime and soda, sulphates of soda and potash, sulphate of magnesia, and carbonate of lime, which was originally a crenate of lime.

One thousand grains of this soil yield to a boiling solution of carbonate of ammonia 3⅗ grains of soluble matter, two-fifths of a grain of which consist of mineral salts, as above named.

The insoluble carbonaceous matters amounted to 24 grains to 1,000, or 2⅖ per cent.

Silica	92.040	per cent.
Alumina	1.500	"
Lime	0.280	"
Magnesia	0.370	"
Potash	1.000	"
Soda	0.500	"
Peroxide of iron and oxide manganese	1.500	"
Phosphoric acid	0.040	"
Sulphuric acid	0.009	"
Chlorine	0.010	"
Crenic, apocrenic, and humic acids	0.360	"
Insoluble vegetable (carbonaceous) matter	2.400	"
Carbonic acid	trace.	
	100.009	

Analysis of the Ash of Sea Island or Long-staple Cotton, from St. Simon's Island, as above.

The stalk of this plant, stripped of its leaves and bolls, when burned, yielded 107 grains of ashes. The leaves, burned, yielded 107½ grains of ashes; and the cotton fibre yielded, when burned, 13 grains to 1,000. One thousand

grains of the seeds, when burned, yielded 36⅔ grains of ashes.

Twenty-five grains of the ashes from the stalks yielded—

Silica	0.600	grains.
Carbonic acid	6.000	"
Chlorine	0.198	"
Sulphuric acid	0.480	"
Phosphoric acid	3.969	"
Lime	7.059	"
Magnesia	0.183	"
Potash	3.802	"
Soda	1.744	"
	24.035	"
Loss	0.965	"
	25.000	

Twenty-five grains of the ashes of the leaves yielded—

Silica	1.200	grains.
Carbonic acid	4.959	"
Chlorine	0.667	"
Sulphuric acid	1.271	"
Phosphoric acid	4.864	"
Lime	6.978	"
Magnesia	0.350	"
Potash	2.922	"
Soda	1.789	"
	25.000	

One thousand grains of the clear cotton fibre, yielding 13.1 grains of ashes, gave—

Silica	0.60 grains.
Carbonic acid	2.80 "
Chlorine	0.30 "
Sulphuric acid	0.54 "
Phosphoric acid	1.64 "
Lime	1.80 "
Magnesia	0.64 "
Potash	2.79 "
Soda	1.90 "
	13.10 "

One thousand grains of the seeds yielded 36⅗ grains of ashes, which consist of—

Silica	0.1000 grains.
Carbonic acid (diff.)	0.3504 "
Chlorine	0.3940 "
Sulphuric acid	0.0980 "
Phosphoric acid	11.3618 "
Lime	1.7484 "
Magnesia	6.0838 "
Potash	13.3566 "
Soda	3.1070 "
	36.6000

No. 2.

Upper Alluvial Soil of Savannah River, on which the Short-staple Cotton grows, in Edgefield, South Carolina.

This soil yields upon analysis—

Silica	78.000 per cent.
Alumina	10.040 "
Lime	0.260 "
Magnesia	0.200 "

Potash	1.000	per cent.
Soda	0.730	"
Peroxide of iron and oxide manganese	4.850	"
Phosphoric acid	0.310	"
Sulphuric acid	trace.	
Chlorine	0.050	"
Crenic, apocrenic, and humic acids.	0.400	"
Insoluble vegetable matter	4 300	"
	100.140	"

One thousand grains of this soil, digested with a solution of carbonate of ammonia, yield $4\frac{9}{10}$ grains of soluble matter, four grains of which consist of the organic acids of the soil, namely, crenic, apocrenic, and humic acids, and nine-tenths of a grain consist of mineral matters—phosphate of lime, sulphate of lime, magnesia, oxide of iron—the alkalies, soda and potash, and a little silica.

This soil has for its mineral constituents the disintegrated matters from the metamorphic rocks, chiefly micaceous and argillaceous slate rocks, the particles of mica being unusually abundant, but the argillaceous matters in a finely decomposed state, or in the condition of clay.

No. 3.

Upland Cotton Soil, from near Jackson, Mississippi, the samples obtained from the surface to the depth of ten inches.

This soil is very fine loam, and, when dry, is almost an impalpable dust. One hundred grains of it on analysis yielded—

Silica	81.00	per cent.
Alumina	6.80	"
Lime	0.57	"
Magnesia	1.60	"
Potash	0.58	"
Soda	1.29	"
Peroxides of iron and manganese	4.18	"
Phosphoric acid	0.38	"
Sulphuric acid	0.07	"
Chlorine	0.05	"
Crenic, apocrenic, and humic acids	0.30	"
Insoluble vegetable matter	3.00	"
	99.82	"
Loss	0.18	"
	100.00	"

The subsoil of the above, obtained twenty inches below the surface, yielded—

Silica	83.451	per cent.
Alumina	4.100	"
Lime	0.500	"
Magnesia	1.800	"
Potash	0.790	"
Soda	1.450	"
Peroxides of iron and manganese	3.900	"
Phosphoric acid	0.190	"
Sulphuric acid	0.014	"
Chlorine	0.005	"
Crenic, apocrenic, and humic acids	0.410	"
Insoluble vegetable matter	3.000	"
	99.610	"
Loss	0.390	"
	100.000	"

No. 4.

Surface Soil from SAMUEL WOOD'S *plantation, in Hancock County, Mississippi.*

One hundred parts by weight of this soil yielded—

Silica	88.52	per cent.
Alumina	1.20	"
Lime	0.40	"
Magnesia	0.50	"
Potash	0.38	"
Soda	1.00	"
Peroxides of iron and manganese	2.00	"
Phosphoric acid	0.60	"
Sulphuric acid (less than $\frac{1}{1000}$)	trace.	"
Chlorine	trace.	"
Crenic, apocrenic, and humic acids.	0.92	"
Carbonic acid	0.20	"
Insoluble vegetable matter	4.33	"
	100.05	"

One thousand grains of this soil yielded to boiling distilled water two grains of soluble matter, or one-fifth of one per cent., and this, on incineration, yielded half a grain of ash, or five-hundredths of one per cent. The ash consists of phosphate of lime, magnesia, oxide of iron, sulphate of lime, and the alkalies, potash and soda.

Digested in a solution of carbonate of ammonia, one thousand grains of the soil produce a dark coffee-brown solution, which, evaporated to dryness, yields ten grains of soluble matter, consisting of the organic acids of the soil, namely, crenic, apocrenic, and humic acids; and on being burned off, this matter yields four-fifths of a grain of ash,

consisting of the mineral salts which were combined with the above-named acids. The organic acids weigh 9⅛ grains, or ninety-two hundredths of one per cent., and the ashes, or mineral salts, eight-hundredths of one per cent.

One hundred grains of the subsoil yield on analysis—

Silica	90.000	per cent.
Alumina	2.000	"
Lime	0.280	"
Magnesia	0.300	"
Potash	0.290	"
Soda	2.014	"
Peroxides of iron and manganese.	1.200	"
Phosphoric acid	0.800	"
Sulphuric acid	0.007	"
Chlorine	0.005	"
Crenic, apocrenic, and humic acids.	1.020	"
Insoluble vegetable matter	2.790	"
	100.716	"

One thousand grains of this subsoil, on digestion with a solution of carbonate of ammonia, at a boiling heat, yield 12½ grains of soluble organic matter and salts; and, on combustion, two grains of saline or mineral matter remain, leaving for organic matters dissolved 12½ grains. The ash contains phosphate of lime, sulphate of lime, soda, potash, and chlorine.

From the composition of this subsoil, it will appear that deep or subsoil ploughing is indicated as appropriate for this plantation; for the subsoil is richer in certain important ingredients than the surface soil, as will be seen on comparing the proportions of soda and of phosphoric acid.

Analysis of the Ash of a Long-staple (Sea Island) Cotton Plant taken from the same Soil as above.

The stalk of this plant, weighing thirteen ounces, on being burned, yielded one hundred and thirty-three grains of ashes, which consist of, in twenty-five grains of the ash—

Silica	1.150	grains.
Carbonic acid	5.600	"
Chlorine	0.603	"
Sulphuric acid	0.412	"
Phosphoric acid	2.739	"
Lime	6.254	"
Magnesia	1.100	"
Potash	2.851	"
Soda	3.351	"
Peroxide of iron	0.940	"
	25.000	"

The dry leaves, weighing seven and one-half ounces, on being burned, yielded three hundred and six grains of ashes, and twenty-five grains of this ash gave, on analysis—

Silica	1.540	grains.
Carbonic acid	3.800	"
Chlorine	2.220	"
Sulphuric acid	1.065	"
Phosphoric acid	2.795	"
Lime	7.275	"
Magnesia	0.200	"
Potash	3.522	"
Soda	1.908	"
Peroxide of iron	0.675	"
	25.000	"

One thousand grains of the fibre, or clean cotton, yielded fifteen grains of ashes, which consist of—

Silica	0.240	grains.
Carbonic acid	3.500	"
Chlorine	1.100	"
Sulphuric acid	0.824	"
Phosphoric acid	1.733	"
Lime	2.641	"
Magnesia	0.200	"
Potash	3.628	"
Soda	0.974	"
Carbon (not burned)	0.230	"
	15.070	"

One thousand grains of the seeds yielded 41⅛ grains of ashes, which consist of—

Silica	0.160	grains.
Carbonic acid	1.200	"
Chlorine	0.430	"
Sulphuric acid	0.872	"
Phosphoric acid	10.640	"
Lime	1.850	"
Magnesia	7.860	"
Potash	12.340	"
Soda	4.472	"
Loss	1.376	"
	41.200	"

Analysis of Ashes of Short-staple Cotton, from Hamburg, South Carolina.

One thousand grains of the clean cotton fibre, burned, yielded fifteen grains of ashes, which consist of—

Silica	0.150	grains.
Carbonic acid	4.100	"
Chlorine	1.105	"
Sulphuric acid	0.779	"
Phosphoric acid	0.581	"
Lime	1.070	"
Magnesia	0.250	"
Potash	4.412	"
Soda	2.140	"
	14.587	
Loss	0.413	"
	15.000	"

One thousand grains of the seeds yielded thirty-nine grains of ashes, which consist of—

Silica	0.080	grains.
Carbonic acid (diff.)	1.018	"
Chlorine	0.480	"
Sulphuric acid	0.892	"
Phosphoric acid	10.690	"
Lime	1.126	"
Magnesia	7.600	"
Potash	13.096	"
Soda	4.018	"
	39.000	"

Analysis of the Seeds of a Short-staple Cotton Plant, from Jackson, Mississippi.

One thousand grains of the seed, burned, yielded twenty-eight grains of ashes, which consist of—

Silica	0.260	grains.
Carbonic acid	1.000	"
Chlorine	0.260	"
Sulphuric acid	0.240	"
Phosphoric acid	7.648	"
Lime	1.122	"
Magnesia	5.032	"
Potash	7.276	"
Soda	4.962	"
	27.800	"
Loss	0.200	"
	28.000	

Analysis of the Ashes of the entire Plant of Upland or Short-staple Cotton, from Savannah River, Georgia.

The whole plant, which weighed three pounds when dried, yielded, on burning, nine hundred and sixty grains of ashes, twenty-five grains of which were resolved into—

Silica	0.570	grains.
Carbonic acid	5.600	"
Chlorine	0.239	"
Sulphuric acid	0.927	"
Phosphoric acid	2.403	"
Lime	4.478	"
Magnesia	2.509	"
Potash and soda (diff.)	6.394	"
Peroxide of iron	1.880	"
	25.000	

Remarks.—By these analyses we learn the nature and proportions of the mineral ingredients which the different

parts of the cotton plants draw from the soil, and which must be present in the soil to render it capable of producing this crop.

Now, since the seeds weigh nearly four times as much as the cotton fibre in each plant, it is evident that, as they are very rich in saline matters, phosphates of magnesia and lime, and in the alkalies, potash and soda, they form one of the most valuable fertilizers to return to the soil. If the seed be sold and sent away for the manufacture of oil, the oil-cake, still containing all the saline matters, may be returned as a manure for cotton fields, and it will be found to be one of the best fertilizers, not only for that crop, but also for corn, which requires a large supply of the phosphates and alkalies.

It does not appear by these analyses that sea island or long-staple cotton plants appropriate any more chlorine or chloride of sodium than the short-staple varieties; and it seems probable that atmospheric influences on the humid seaboard favor the growth of the long-staple cottons, and that the saline matters in the soil do not produce the difference by their absorption into the plants.

SECT. VIII.—AGRICULTURAL STATISTICS.

We present the following table as a fair average for twenty years, including 1840 and 1860, of the productions of the cotton States. As to the land, improved and unimproved, we are unable, at this date, to speak with precision, but we believe the statement in the table is not far from correct:

Agricultural Statistics of the Cotton States, according to the Census of 1850.

STATES.	Acres of land in Farms.		Value Farms and Implements.		Value of animals slaughtered.	Products of Orchards.	Product of Market Gardens.	Home-made Manufactures.
	Improved.	Unimproved.	Cash value of Farms.	Implements, &c.				
North Carolina	5,453,975	15,543,008	67,891,766	3,931,532	5,767,866	34,348	39,462	2,086,522
South Carolina	4,072,651	12,145,049	82,431,684	4,136,854	3,502,637	35,108	47,286	909,525
Georgia	6,378,479	16,442,900	95,753,445	5,894,150	6,339,762	92,776	76,500	1,838,968
Florida	349,049	1,246,240	6,323,109	658,795	514,685	1,280	8,721	75,582
Alabama	4,435,614	7,702,067	64,323,224	5,125,663	4,823,485	15,408	84,821	1,934,120
Mississippi	3,444,358	7,046,061	54,738,634	5,762,927	3,636,582	50,405	46,250	1,164,020
Louisiana	1,590,025	3,399,018	75,814,398	11,576,938	1,458,990	22,859	148,329	139,282
Texas	643,976	10,852,863	16,550,008	2,151,704	1,116,137	12,505	12,354	266,984
Arkansas	781,530	1,816,684	15,265,245	1,601,296	1,163,313	40,141	17,150	638,217
Tennessee	5,175,173	13,808,849	97,851,212	5,360,210	6,401,765	52,894	97,188	3,137,790

STATES.	LIVE STOCK.							Value of Live Stock.
	No. of Horses.	Asses and Mules.	Milch Cows.	Working Oxen.	Other Cattle.	Sheep.	Swine.	
North Carolina	148,693	25,259	221,799	37,309	434,402	595,249	1,812,818	17,717,647
South Carolina	97,171	37,483	193,244	20,507	563,935	285,551	1,065,508	15,060,015
Georgia	151,831	57,379	334,223	73,286	690,019	560,435	2,168,617	25,728,416
Florida	10,848	5,002	72,876	5,794	182,415	23,311	209,453	2,880,058
Alabama	128,001	59,895	227,791	66,961	433,263	371,880	1,904,540	21,690,112
Mississippi	115,460	54,547	214,231	83,485	436,254	804,929	1,582,734	19,403,662
Louisiana	89,514	44,849	105,576	54,968	414,798	110,333	592,301	11,152,275
Texas	76,760	12,463	217 811	51,285	61,018	100,530	692,022	10,412,927
Arkansas	60,197	11,559	98,151	34,289	165,320	91,256	836,727	6,647,969
Tennessee	270,636	75,803	250,456	86,225	414,051	811,591	3,104,800	20,978,016

Agricultural Statistics.—Continued.

STATES.	Wheat, bushels.	Indian Corn, bushels.	Oats, bushels.	Rye, bushels.	Rice, pounds.	Tobacco, pounds.	Ginned Cotton, bales of 400 lbs.	Wool, pounds.
North Carolina	2,130,102	27,941,051	4,052,078	229,563	5,465,868	11,984,786	73,845	970,738
South Carolina	1,066,277	16,271,454	2,322,155	43,790	159,930,613	74,285	300,901	487,283
Georgia	1,088,584	30,080,099	3,820,044	58,750	88,950,691	423,924	499,091	990,019
Florida	1,027	1,996,809	66,856	1,152	1,075,090	998,614	45,131	23,247
Alabama	294,044	28,754,048	2,965,626	17,261	2,312,252	164,990	564,429	657,118
Mississippi	137,990	22,446,552	1,503,288	9,606	2,719,856	49,960	484,292	559,619
Louisiana	417	10,266,373	89,637	475	4,425,349	26,878	178,737	109,597
Texas	41,729	6,028,876	199,017	3,108	88,203	66,897	58,072	131,917
Arkansas	199,639	8,893,939	656,183	8,047	63,179	218,936	65,344	182,595
Tennessee	1,619,386	52,276,223	7,703,086	89,137	258,854	20,148,932	194,532	1,364,378

STATES.	Cane Sugar, hhds. of 1000 lbs.	Maple Sugar, pounds.	Butter, pounds.	Cheese, pounds.	Wine, gallons.	Hay, tons.	Irish Potatoes, bushels.	Sweet Potatoes, bushels.
North Carolina		27,932	4,146,290	95,921	11,058	145,653	620,318	5,095,709
South Carolina	671	200	2,981,850	4,970	5,880	20,925	136,494	4,337,469
Georgia	1,642	50	4,640,559	46,976	796	23,449	227,379	6,986,428
Florida	2,750		371,498	18,015	10	2,510	7,828	757,226
Alabama	8,242	643	4,008,811	31,412	220	32,685	246,001	5,475,204
Mississippi	888		4,346,234	21,191	407	12,504	261,482	4,741,795
Louisiana	226,001	255	683,069	1,957	15	25,752	95,632	1,428,453
Texas	7,351		2,344,900	95,299	99	8,354	94,645	1,332,158
Arkansas		9,330	1,854,239	30,088	35	3,976	193,832	788,149
Tennessee	248	158,557	8,139,585	177,681	92	74,091	1,067,844	2,777,706

SECT. IX.—PRINCIPAL DISEASES.

If any one supposes that the South is a paradise, where sickness and sorrow find no place, he is mistaken. We are all of the earth, earthy, and more or less liable to disease. The South is not exempt.

On the other hand, if any one supposes that the South is a hotbed of disease, generating, more than any other region, diseases foul, pestiferous, and incurable, he is equally mistaken.

The South is as healthy as the North. There, reader, we assure you, is the result of forty years' observation, made by intelligent physicians in both sections of the country.

Let the bills of mortality be produced, and we have no fears for the correctness of our statement.

New Orleans is as healthy as Boston; Charleston is as healthy as New York.

We have the same miasmatic diseases here which prevail generally in the valley of the Mississippi, from Minnesota to Louisiana.

We have intermittent fever in its simple, inflammatory, and congestive forms; remittent bilious fever, in the same varieties. We have also typhoid fever, with its self-limited, lingering peculiarities; scarlet fever, which runs its course, as everywhere else; and, in certain localities, as in New Orleans, Mobile, Charleston, Savannah, and other seaports, we have had occasionally the yellow fever, which has long since become disarmed of its terrors by an enlightened medical profession.

The scourge of nations—epidemic cholera—has never been so prevalent in the South as in the North and West.

Whether this is owing to the wide-spread distribution of silicious and loamy soils and subsoils of the tertiary formation, holding "freestone water," or to some other cause, we will not say. But the fact is historical and worthy of notice, that throughout the larger part of the area of the Southern States cholera is unknown.

With regard to constitutional diseases, such as consumption, rheumatism, and the various forms of scrofula, a man is certainly as safe south of the parallel of 35° as he is north of it; and in reference to local, irritative, and inflammatory affections, we know, from personal observation, that Mississippi is healthier than Indiana,

Acclimation.—The whole mystery of acclimation is simply this: let a new-comer obey the laws of health, and he will escape; let him violate these laws, and he will suffer the penalty.

If, forgetting the dictates of reason and the promptings of refined emotion, he yield himself to animal impulse, eat and drink like the brute that fattens for the slaughter-pen, he deserves to pass through the fiery ordeal of fever.

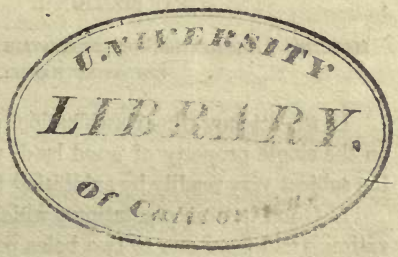
If, on the other hand, he inquire into the laws which regulate the preservation of health and the prevention of disease, and submit himself, body, soul, and spirit, to the obedience of these laws, immunity is the result.

Let him avoid night air, malarious swamps, big suppers, and the whiskey bottle; let him keep in the shade as much as possible from ten o'clock A. M. to three P. M.; let him shun all barbecues, midnight balls, and masquerades; let him learn to subdue his passions and improve himself in morality, and, our word for it, if he possesses a good constitution as a basis of operations, he will pass along unscathed.

It is a popular idea that the immigrant *must have* the acclimating fever. This idea is erroneous. Many of our

acquaintances from the North and West have resided here for fifteen years past, enjoying almost uninterrupted health, and entirely escaping the *inaugural* disease.

Many escape unhurt during the first year, and are taken down the second season. They allow disease to accumulate in their systems for twelve or eighteen months, and then it manifests itself in the form of a bilious fever. To all such our advice, already given, is specially applicable.


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CHAPTER V.

CULTIVATION OF COTTON.

SECTION I.

SELECTING A PLANTATION—CLASSIFICATION OF FARMS—PRICES—EMPLOYING HANDS.

If we attempt the classification of plantations, based on the single property of good land, we might dispose of the subject very readily by exhibiting the following grades:

1. Good bottom plantations, which, upon careful cultivation, yield from one to two bales per acre.

2. Good upland plantations—fine table-land, with more or less creek bottom, yielding from one-half to one bale per acre.

3. Second-rate upland plantations—land more undulating than No. 2, yielding from one-third to one-half bale per acre.

4. Poor hills, yielding from one-eighth to one-fourth bale per acre.

The first, while in the woods and the cane, were sold before the war for prices ranging from five to ten dollars per acre; though fifteen or twenty years ago the same lands were bought by speculators as swamp lands for prices ranging from twenty-five cents to one dollar per acre.

Good wild lands in the Mississippi bottom can now be

bought for five dollars per acre. It must be noticed here that the best plantations, as to quality, are not always the most desirable localities. Thus, for example, some of the richest alluvial lands in the Mississippi bottom are in the midst of a vast wilderness of cane, oaks, bears, and wild-cats. The man who is fond of a "lodge in some vast wilderness" might be content, with a few companions and laborers, in such a retreat; and after he has cleared his plantation, and patiently waited for the coming of the second or third year, he will be richly rewarded for his labor. But he who wants good society, churches, schools, and all the conveniences of refined life, would not fancy such a location.

Again, it is important that a planter should have a good outlet. He might possibly find a rich place, above overflow, but unfortunately surrounded by impenetrable swamps. Two bales to the acre might be made in theory, but not in practice.

During the days of our "patriarchal institution" our wealthiest planters owned at least two plantations—the "home place" and the "one in the bottom." The residence, with all the comforts of life, was located on the former, and the detailed negroes, under an overseer, worked the latter.

What changes may be brought about by the abolition of slavery we are not fully prepared to say. We presume, however, that the arrangements will not be quite so extensive, and the bales will not be piled quite so high.

The best bottom plantations are those immediately on a river above overflow. Such locations are decidedly healthier than any in the interior of the bottoms.

For a family residence and plantation we think the best table and creek-bottom land of the hill country is, upon the whole, more desirable—more especially when we

take in view the social and moral advantages. Places of this kind, with respectable improvements, can be bought for prices ranging from fifteen to twenty-five dollars per acre. Second-rate upland places, more or less worn, but capable of good repair, can be had for prices ranging from six to twelve dollars per acre.

There are four requisites for a good plantation: 1. Good soil, well diffused over land that cannot wash away. 2. Good timber and plenty of it. 3. Good water in abundance. 4. Contiguity to a good landing or depot. A man endowed with common sense will take all these things into consideration. By reference to Chap. IV., sec. 5, the reader will find that all the timber trees useful for building and fencing are found in our forests.

On all places not well watered there is one remedy—dig wells and pools.

Employing Hands.—During the present year (1866) hands have been employed at various rates and upon various contracts. Most of the employed hands are the negroes formerly owned by the employers. These, together with our noble army of young men returned from the field of battle, constitute nine-tenths of the agricultural working force of the South. Some, preferring wages paid monthly, are receiving from eight to fifteen dollars per month and board; but the larger portion are working upon contracts by which they are entitled to receive from one-half to one-third of the cotton crop—the employer agreeing to furnish the land, the working stock, and the farming implements; the employee agreeing to furnish his own food and clothing, and pay his doctor's bills and taxes. We presume similar arrangements will be made hereafter.

It is usually estimated that one hand will cultivate about fifteen acres—five in corn and ten in cotton.

SECTION II.

STOCKING THE PLANTATION—HORSES, MULES, FARMING IMPLEMENTS, ETC.

Let us suppose that a man of moderate means has purchased or rented a small place, say two hundred acres; and that he wishes to cultivate one hundred acres which are already cleared. What stock, implements, and number of hands does he need? We will try to answer the question by placing before the reader's eye a bill of items.

4 horses or mules, at $150	$600.00
4 turning ploughs	25.00
4 broad shovels	25.00
Plough harness	25.00
1 wagon	80.00
1 yoke oxen	100.00
Axes, hoes, shovels, and spades	20.00
Saws, augers, chisels, hammers, and sundry tools.	25.00
Cross-cut saw	10.00
	$910.00

In addition to this bill, the new-comer will need corn sufficient to supply his wants from the first of January to September, when corn comes in, say three hundred bushels, which will cost him $300. The entire bill amounts to $1,200.

To run this little plantation will require at least six good hands constantly in the field and two at the house, unless the latter can be supplied by a man's own family. If circumstances are favorable, our small planter will probably make thirty-five bales of cotton and eight hundred bushels of corn. This will be a profitable business, reckoning cotton at thirty cents per pound. After paying off his hands, he can pay for his stock and implements and

meet all his family expenses for the year. He would then have his work stock and farming implements paid for, and corn in his crib sufficient for the next year.

SECTION III.

PREPARATION OF THE GROUND.

It is proper to remark here that if the immigrant chooses to purchase a place in the woods, it will be impracticable to plant cotton the first or second year. He must content himself with being a *corn planter* for two seasons, at the same time raising fruits and garden vegetables. Cotton will not do well in new ground.

Again, we may remark that many places need draining on account of wetness. The advantages of draining, wherever it is needed, cannot be too highly appreciated. It not only carries off the surplus moisture, but warms the soil, pulverizes the land, promotes the absorption of fertilizing substances, enables the tap-root of cotton to penetrate into the subsoil and draw nourishment therefrom, and, in few words, improves crops both in quantity and quality. It has also been demonstrated that highlands derive great benefit from drainage. It prevents surface washing, the falling water being rapidly absorbed and running to the ditches. It also prevents drought, by rendering the subsoil more permeable to water, and also by pulverization; by deepening the soil; by compelling the roots to strike downward at once and to prepare for drought; and by increasing the capacity of the soil to absorb moisture from the atmosphere.

Fertilizing the Land.—Many of the old fields of the South, which may be marked "I. C."—*Inspected and Con-*

demned—can be restored to pristine vigor by careful fertilizing. If calcareous manures are needed, we have marl in every variety—clay marls, stony marls, greensand marls, and shell marls, containing from forty to fifty per cent. of carbonate of lime, forty to fifty of silicious matter, from five to ten of organic matter, with traces of iron and manganese, and other substances in very small proportions.

If vegetable mould is needed, it can be easily obtained; but the most convenient of all fertilizers, and one which Southern planters have been using many years, is the cotton seed. We refer the reader to Chapter IX. for further remarks on this subject.

Rolling Logs and Cleaning up.—A cotton crop occupies the time and attention of the planter just one year. We ask the reader to accompany us to the field about the first of January. The hands are *rolling logs* and *cleaning up.* Some are setting fire to the big log heaps; others are knocking down or pulling up the old cotton stalks and gathering them together to be burned. In another portion of the field, which has already been brushed off, an irregular procession of ploughs may be seen, and these useful tools, with a horse or mule at the beam, and a negro at the handles, have already commenced the work of *bedding up.* This is done by throwing from four to six furrows of the turning plough together. The number of furrows required to make the bed depends upon the character of the land—poor land requiring fewer furrows than the rich alluvial bottoms, where the cotton plant spreads itself. As the time for planting approaches, these beds are reversed—that is, they are thrown back into the middles in the same manner that they were originally thrown up. This is styled "rebedding," and should not be done until very shortly before planting time.

Hill-sides or undulating ground must be carefully *circled*, to prevent washing. This process consists in ploughing round the hills and undulations in such a manner as to have your beds nearly horizontal—say a fall of one inch to fifteen feet. Your cotton beds then are so many levees, which confine the water to the middles, from which it is gradually conveyed by means of the fall to the terminus of the rows, excepting that which is taken up by absorption or which is evaporated. We are now ready to consider the next step in this complicated work.

SECTION IV.

PLANTING, TIME WHEN—SELECTING SEED—QUANTITY TO THE ACRE—PLANTING BY HAND—BY THE PLANTER—THE COMING UP—A GOOD STAND.

The time for planting varies with the latitude. In the southern part of the Gulf States corn is planted in February and March, and cotton about the first of April; but in the region lying north of the thirty-third parallel, corn is planted in the latter part of March, and cotton from the middle to the latter part of April.

Selecting Seed.—It is highly important to select good seed. Sound seeds have a greenish-black color, are plump, ellipsoid in shape, about half an inch in their larger diameter, and about a quarter of an inch in their smaller. When cracked by the teeth, they pop, and the internal substance is white and slightly creamy in color, yielding upon pressure more or less oil. If they do not present these tests upon examination, they are worthless for planting. You may give them to the hogs.

Every thing being now ready, we proceed to deposit

the seed in the ground. If your bed is rough and cloddy, an iron-tooth harrow may be drawn over it. You then open your bed with a small plough or duck-bill colter to the depth of about two inches. In this furrow the seeds are sown by hand from a sack or apron. The covering-block follows the sower. This is drawn by a mule driven by a negro. The apportionment of these hands is as follows: one to open, two to drop the seed, and one to cover. This plan is still adopted over a large portion of the country; but of late years we have been introducing and using with great success the machine called the "cotton-planter," which, with one hand and one mule, will do the work of four hands and two mules on the old plan. The cotton-planter is simply a light but substantial framework in which the various parts are adjusted as follows: The *opener* is introduced through the beam immediately in rear of the clevis-pin; at a distance of two or three inches behind this comes a blunt, wedge-shaped piece of wood, the object of which is to smooth out the furrow made by the opener, and to prevent the dirt from falling in and filling it up. Then follows the revolving cylinder containing the seed. This cylinder has small holes about an inch and a half in length and three-fourths of an inch in width, cut about every six or eight inches apart entirely around its middle circumference. The seeds drop through these holes into the furrow made by the opener, and are covered by a board which is placed immediately behind the cylinder.

Under the old system of hand-dropping, three bushels of seed to the acre were necessary; but upon the improved plan, a bushel or a bushel and a half is altogether sufficient.

In a week or ten days after planting the seeds come up, and, under favorable circumstances, as thick as hops on a vine. In ten days more the young plant has attained a

height of three or four inches, and demands immediate attention. The planter thinks he has a *good stand*, but, if he be a man of experience, he knows that *eternal vigilance* is the price of *cotton* as well as of *liberty*.

SECTION V.

TENDING THE CROP—BARRING OFF—SCRAPING—CHOPPING OUT—HOEING AND DIRTING AGAIN AND AGAIN—GOOD SEASONS—RAPID GROWTH—THE FIRST BLOSSOM—THE BOLLS—ESTIMATED NUMBER ON A STALK TO MAKE A BALE TO THE ACRE—IN THE GRASS AND OUT OF THE GRASS.

THE situation of the plant at this stage is simply this: it is standing thickly set in the middle of a ridge or bed, surrounded by grass and weeds. Two things are necessary to be done, with as little delay as possible: the grass must be removed, and the cotton thinned out: to effect these important purposes, we start the hands with turning ploughs to *barring off*. This is done by running the bar of the ploughs lightly on each side of the row, and as near the cotton as convenient, so as to throw the dirt from the plant. Immediately at the heels of the plough hands follow the hoes. These do the work of thinning. This consists of cutting out the cotton to the width of the hoe, or about twelve or fourteen inches, and leaving it in bunches of from three to six plants each. After the thinning, as soon as practicable, say in three or four days, the shovel ploughs come along and throw the dirt back to the cotton, covering up what young grass may have been left by the hoe hands, and affording a support to the young plant. This is called *dirting* or *moulding*. The hoes follow immediately after the dirting, and bring the cotton to a stand by chopping out the bunches, left at the previous hoeing, to one or two plants.

We may remark in this connection, that many planters, instead of barring off with the turning plough, employ the scraper—a sharp-edged implement, somewhat plough-like in its appearance, which cuts away the grass from the cotton, and leaves it standing in the midst of a smooth, bald ridge. The ridge, after scraping, is liable to bake under the influence of the sun; and as the roots of the cotton are now very short and tender, and require a pulverized soil, we believe the barring-off process to be preferable.

The subsequent cultivation may be varied according to the nature of the season. The ploughs, hoes, and sweeps will be used as they may be found best adapted to the condition of the crop.

The latter implement is, like the scraper, of modern introduction. It resembles one of the hoes of a harrow, flanked with wide-cutting blades or wings, forming two sides of a triangle, and mounted on a beam; is capable of *sweeping* the whole width of the row or the greater part of it at once, loosening the soil, and destroying weeds, vines, and every thing that does not require to be turned under and effectually buried. It is a very efficient tool, and is employed with advantage, and especially in dry seasons, in keeping down the vine (*convolvulus*, or morning glory), which, if not thoroughly done, is an after-source of great annoyance and damage.

With favorable seasons the plant grows rapidly, more especially after the tap-root has penetrated deep into the soil.

The first blossom is sought after with great anxiety. This is found at different dates in different localities, from the first of June to the fourth of July. The young bolls, surrounded by the *squares* or *forms*, appear upon the

dropping of the bloom. In their infant state they look something like a small, conical apple soon after its emergence from the germ state. In their full maturity they are as large as pullet eggs, still preserving their conical shape. From two to ten grow on a limb, and not unfrequently we have counted two hundred on a single plant.

It is estimated that one hundred bolls of cotton will make one pound of cotton in the seed. Now allow that you plant your cotton in rows three feet and a half apart, and chop it out to eighteen inches in the drill; this would give you on a square acre of ground sixty rows of cotton, with one hundred and forty plants to each row. Suppose that you pick on an average twenty bolls from each stalk, then every five stalks would furnish you with one pound of seed cotton, and every row with twenty-eight pounds. The sixty rows would furnish 28×60, or 1,680 pounds of seed cotton, which will ordinarily make an average-sized bale.

If in the month of July the crop is clean, blooms and bolls are loading the branches, and good seasons have coöperated with the planter's labor, he may, barring all future accidents, consider himself "good for a full crop." But if, on the other hand, he has neglected to cultivate the plant, supplying its wants and keeping off its enemies, with the best seasons that Heaven can send, he will inevitably find himself "in the grass;" and how to get out of that grass is a problem the solution of which requires more labor, bigger drops of perspiration, and *the extraction of more roots*, than any thing in the department of mixed mathematics. Indeed, the problem may be thus stated:

Given, sundry cotton rows, handsomely covered with flourishing grass; it is required to find the cotton.

Still further, it is required to save the cotton by ex-

terminating the grass. This is perhaps the most difficult part of the solution, because the season has so far advanced, and all the circumstances are likely to be so untoward, that, not unfrequently, the planter after a few days' work is utterly discouraged, and reasoning as the fox did about the grapes, says in his heart, if not with his mouth, "*The worm will get it anyhow, it's no use to try any longer.*" Then issuing his orders to all the hands, he leaves the grassy plain, and thus *gets out of the grass.* But it is not always so. Indeed, most of our planters get somewhat in the grass every season, but by faithful "pegging away" get out and save their cotton.

SECTION VI.

LAYING BY—OPENING OF THE BOLLS—A FINE SUCCESSION OF RAINS—TOO MUCH RAIN—DRY WEATHER.

Laying by is giving up a crop to take care of itself. The last ploughing and hoeing constitute the laying by. This occurs at different dates according to different circumstances. The planter should never lay by as long as he can materially profit his crop by working it. Some are detained in this operation as late as the first of August. After this the hoes may be of some service in removing grass and weeds that may have escaped former workings; but it is not expedient to use the plough, simply because the branches and bolls now crossing and lapping would be injured by the mules and swingletrees, and not because of any injury inflicted upon the roots.

The bolls begin to open from the middle of July to the middle of August. This opening is caused by the separation of the valves of the capsule, and the concurrent

expansion of the four internal cells containing the cotton; and the process continues onward till winter. At first the cotton in the cells is a moist, pithy-like substance, but gradually, under the influence of the sun, assumes a dry, fibrous, woolly-like character, and hangs nodding from the pericarp ready to be gathered.

Before we proceed to consider the subject of picking, we must say something about rains and dry weather. In the early part of the planting season, and indeed up to the opening of the bolls, light rains, "refreshing seasons," at intervals of eight or ten days, are very acceptable; but after the opening of the bolls commences, lighter showers at longer intervals are altogether sufficient. Indeed, the only rain desired is just a sufficiency to keep the plant alive—to prevent its shedding its foliage to such an extent as to expose the young and partially developed bolls too much to the sun. Long-continued drought in June and July will cause shedding of the forms and may prove disastrous. After the middle of September, dry weather can do no material injury, but is rather advantageous.

Heavy, drenching, long-continued rains are always more or less injurious. Should they occur when the cotton is young, it will be to a great extent drowned out, and the stand destroyed. The plant will also be much more liable to rust and sore-shin. Coming on later in the season, when the plant is covered with bolls and forms, heavy rains will cause what is known as the second growth. The plant will grow large and tall, its foliage will be dense and green, and the consequence is that a large part of the bottom bolls will be rotted, and the top bolls, from an excess of sap, will fail to come to maturity in time to escape the blighting influence of frost.

SECTION VII.

PICKING—AUGUST TO JANUARY—GOOD AND BAD PICKING—QUANTITY PER DAY—PICKING BY MACHINERY—FINGERS THE BEST MACHINE—STORING AWAY THE COTTON—QUANTITY OF SEED COTTON TO THE ACRE.

PICKING commences in the more southern part of the cotton region about the middle of July, but from the latitude of Montgomery, Alabama, at various dates from the middle to the last of August. The field is usually picked over about three times, and the season generally continues till late in the fall; and we have often seen hands at work in the field till the close of the year.

A few days before the commencement of the operation the big hamper baskets are prepared, each one holding from 75 to 150 pounds. These are placed at convenient distances in the field; the hands are all ready, each one taking two rows, the haversack suspended from his neck, into which he deposits the locks of cotton. When the sacks are full, the contents are emptied into the baskets, and the latter are moved up from point to point as convenience may require; and thus they move all day long, resting for dinner, and at night bring home their baskets filled with the fleece of the plant. A good hand will pick two hundred and fifty pounds per day; a moderate hand one hundred and fifty; an inferior hand from seventy-five to one hundred. The cotton is weighed usually at noon and at night, and deposited in covered rail pens, from which it is subsequently hauled to the gin house. Should the cotton be picked damp, it will be necessary to sun it, which is done on a large scaffold or platform, erected immediately in front of and adjoining the gin house. For this reason the gin house should always front to the south.

Several machines have been invented for the purpose

of picking cotton; and the advertisements in our papers, setting forth their superior advantages, remind us of the wonderful virtues of infallible patent medicines. Up to this time, we have seen no machine equal to the fingers of a good stout, brisk negro.

When a sufficient quantity of cotton has been picked and penned, it is removed to the gin house, and stored away carefully in the large upper chamber convenient to the gin stand. Here it lies till all things are ready, secure from all hurtful influence.

The quantity of seed cotton to the acre varies, of course, with the quality of the land. The best bottom lands will yield from 1,600 to 3,000 lbs.; the best highland places will make from 1,200 to 1,500 lbs.; good second-rate highlands from 600 to 800 lbs.; and poor hills from 100 to 400 lbs. In 1860 there were 8,000,000 acres under cultivation, and something over 4,000,000 bales were produced, or a half bale per acre as an average. Now, as it takes about 1,600 lbs. of seed cotton to make a bale, it follows that 800 lbs. of seed cotton was the average per acre in 1860.

SECTION VIII.

GINNING AND PRESSING—BALING.

Forty years ago, in old Virginia, we saw the negroes picking the cotton seed from the fibre with their fingers. There was one man in the neighborhood who had a roller-gin stand, and he was considered ahead of everybody else. Whitney's gin had not yet been introduced, although employed by Georgia planters for twenty years. It was indeed a great invention, and deserves to take rank with the telescope and mariner's compass. The modern improve-

ments upon Whitney have brought the machine to perfection, and we now behold it doing the work which, fifty years ago, was performed by three hundred hands.

The cotton gin now used is composed of a stand about six feet in width, inclosing a cylinder and brush, arranged horizontally, and running on iron axes in composition metallic boxes. On the cylinder are arranged a series of circular saws, made of the best cast-steel plates, in segments, or two parts. They are placed about one inch apart, and are so secured to the cylinder as to insure perfect accuracy and uniformity of action. The teeth are very pointed and oblique, and are very carefully and smoothly dressed. The cylinder, when put in motion by a band running on a trundle-head attached to it on one side of the stand, and by which it is connected with the running gear, revolves in such a manner that the teeth pass between a corresponding series of metallic grates, curved or bent so as to conform to the circumference of the saws, and placed in such a manner as only to permit the free passage of the teeth of the saw, together with the lint which it removes in its revolutions. The grates form one side of a movable hopper, the breastboard or *fall* in front forming the opposite; the hopper working on hinges at the bottom, by which the grates can be elevated above the saws as occasion requires.

In its working position, the teeth of the saws pass through the grates and enter the hopper just so far as to take a proper hold on the cotton, with which it is kept supplied by raking it from the pile of seed cotton deposited on the top of the stand.

In operation, the saws passing through the cotton cause it to revolve in the hopper, and form a roll from which the seeds, as the lint becomes detached, fall to the bottom, and are removed by means of a spout.

In the rear of the cylinder, and in contact with it, is a circular brush of bristles supported on arms which, revolving by means of the gearing with great velocity, compared with the revolutions of the saws, whips or brushes rapidly and completely from them the lint or fibre drawn through the grates. The velocity with which this fan-like brush revolves causes a strong draught of air through the apertures in the stand, which wafts the lint in light flakes through a flue to the lint room, made close and tight for its reception. The flues are constructed with a false floor of slats, between which much of the false seed and trash, which may have passed through the grates with the lint, falls in passing to the lint room, and the cotton is thus freed from these impurities.

A good sixty-saw gin will gin five or six bales a day; but the average performance, where care is taken to make a good article, is not more than three bales.

From the lint room the cotton is taken to the press.

The boxes in which the cotton is pressed in packing, are made of wide three-inch plank, and are four and a half feet long and twenty-two inches wide, securely keyed together, and having side doors hinged on the ends to take out the bales when pressed and tied; the top and bottom of the box, either of which is called the follower, as the pressure is applied from above or below, according to the construction of the press, are made of similar timber, with seven grooves at regular and corresponding distances, through which to pass the ties.

Preparatory to making the bale, a piece of bagging of suitable dimensions is spread on the bottom of the box. A proper quantity of cotton being packed or trodden in, another piece of bagging, of sufficient size to complete the covering, is laid on, the screw or lever is put in motion,

and the follower ascends or descends into the box, as the case may be, to the edge of the side doors, which are then thrown open; the ends and edges of the bagging are gathered together and stitched with twine, and the ropes passed through the grooves and tied. The movement of the screw or lever is then reversed, the pressure removed, and the bale taken out. Instead of rope, hoop iron is used to a great extent by our planters. They are coated with paint to prevent rust, and are fastened by means of rivets passed through holes punched at proper distances. It is believed by many that the hoop iron will, in a few years, entirely supersede the use of rope.

The motive power, in most of our gin houses, consists of four mules, hitched to a horizontal lever, passing through a vertical shaft, upon which is constructed the large central cog-wheel. The cogs are made to play into a wallower or vertical spur-wheel, on one end of a horizontal shaft, to the opposite end of which the band-wheel is attached; a gum band, about a foot in width, connects this with the trundle-head of the gin stand, and puts the machinery in motion. On some plantations steam is used instead of horse power.

Bales are put up so as to weigh about 500 lbs., though the commercial bale is estimated at 400. After being marked and numbered, the bales are hauled in wagons to the most convenient depot, from whence they are shipped to market.

SECTION IX.

THE MARKET.

Cotton is usually consigned to a merchant in a city or large town; and the planter can use his discretion about its sale. He may instruct his merchant to sell immediately,

or wait for a higher market. He may allow him to use his own judgment, or give him special instructions, limiting as to time and price.

The merchant or factor takes the cotton, stores it away in his shed, takes samples, and goes out in search of a buyer. After receiving several bids from various brokers, he finally closes down on one at a stipulated price per pound. The cotton is weighed, the calculation made, the money paid to the merchant; the merchant settles with the planter, charging him for storage, commission, drayage, repairage, weighing, and insurance.

In addition to all these charges we now pay, "by constraint, not willingly," the government tax of three cents per pound. This tax we will consider in another chapter.

The whole expense on a bale of cotton, from the time it leaves the planter's depot until it is sold to a broker, may be estimated as follows:

Freight (say 40 miles)	$2.00
Drayage	50
Storage	50
Repairage (probably)	25
Weighing	25
Insurance	1.00
Commissions	4.00
Government tax	15.00
Total	$23.50

GRADATION OF QUALITY AND PRICES.

There are three primitive classes of cotton, viz., ordinary, middling, and fair; but factors and brokers have made so many wool-splitting distinctions, that we are compelled to recognize all their divisions and subdivisions.

We presume the following would be regarded as an exhaustive classification:

Primitive Class.	*Subdivisions.*	*Prices supposed.*
1. Ordinary...	Low ordinary.....	25c. per lb.
	Ordinary	27c. "
	Good ordinary.....	32c. "
2. Middling...	Low middling	34c. "
	Middling	36c. "
	Good middling	40c. "
3. Fair.....	Middling fair.....	44c. "
	Fair.....	48c. "
	Fine fair.....	50c. "

It is a very easy matter for us to see the difference between low ordinary and middling, or between middling and fine fair; but the art of discriminating by a glance of the eye, so as to determine with precision where middling ends and good middling begins, belongs to the factor and broker; and they have it in their special keeping, often agreeing and often disputing.

We have witnessed some of these disputations, much to our amusement and greatly to our moral training. The factor and broker preach from the same text, but their sermons are widely divergent. The text is this: Self-interest is a primary principle of human nature. The factor unrolls his specimen or sample, and says, "Here, Brother Broker, I want to sell you a good bargain this morning. Look at that sample of middling."

"Middling, indeed!" responds the broker; "I call that low middling."

"I don't see it," says the factor.

"I don't see that it is middling," responds the broker. "However, how many bales have you?"

"Twenty," answers the factor.

"What will you take?"

"Thirty-six."

"Can't give it."

"What will you give?"

"Thirty-four."

"Can't take it."

"I'll split the difference and give you thirty-five."

"Take it. Write out your draft quick; I'm in a hurry."

"Just wait, my friend, till I see the twenty bales, and have 'em weighed."

A laugh and a joke close the conference; but before night the transaction is closed. The cotton changes hands, and the broker ships it as soon as possible to New York or New Orleans, and "realizes"—perhaps a profit, perhaps a loss.

SECTION X.

THE SUCCESSFUL PLANTER—EXPERIMENTS MADE BY NORTHERNERS IN 1866—A SENSIBLE VERMONTER.

The successful planter is a man who must possess a certain kind and degree of intelligence and executive ability. He may be a learned man, or a very illiterate one. The learning is not objectionable—indeed, on many accounts, very desirable; but much learning will not make cotton unless the possessor applies it properly to practice.

Some of our best planters are well-educated men. Some of our best-educated men are poor planters, and some of the most successful planters in the country are the most illiterate. Hence, we infer a man must have cotton-planting sense. He must have sound common sense, good perceptive faculties, strong animal energy, indomitable perseverance, good governing faculties, and an all-con-

quering will. He must be trained in the school of experience. He must know "the times and the seasons" of the cotton plant. He must study its wants, watch its growth, notice its developments, and give direction to his hands to work precisely in accordance with his orders.

A kind Providence has placed all things under law. All the ordinances of Nature are the laws of God. If man obeys them, he will be blessed in natural advantages and privileges. If he disobey, he will suffer punishment. And all this natural administration of affairs is entirely independent of moral character. True, the moral and the natural do not come in conflict; they are harmonious, coming from the same Author. But we mean that moral goodness, disregarding natural law, will never make a cotton crop; and still further, that well-directed industry, conforming to the laws of cotton growth, will make a cotton crop, whether the planter be a saint or a sinner.

We are strong advocates of natural as well as moral Providence. "God sends his rain on the just and on the unjust." He has ordained seasons, soils, climates, and zones of vegetation. He has endowed men with the capacity to study the history, habits, wants, necessities, and demands of every plant on the globe, and to determine their respective utility.

If man's labor harmonize with Nature's ordinances, the labor will prove a success. If the labor come in collision with Nature, it must prove a failure. Oranges cannot be cultivated in the frigid zone, and the polar bear cannot be trained to live in the torrid zone. Nature forbids it. So, too, with regard to our mighty and influential plant. It must be treated in accordance with its nature. It must be planted and cultivated in a soil and under a climate adapted to its physical constitution; and he who dares to

violate the laws which govern the planting and culture of cotton, will find himself the loser.

Many of our "Northern friends" have made experiments among us during the present year, in raising cotton. So far as we have learned, nearly all of them are "*in the grass*," with little hope of recovery. They trusted too much to their own wisdom, and to the "intelligence and faithfulness" of their colored friends. Very few of them will be able to "make buckle and tongue meet," and many of them will come out in debt.

We heard of one sensible Vermonter. He came all the way down from the Green Mountains, and selected a river plantation, stocked it well, and hired a good, practical overseer or superintendent—a man who was born and raised in the country, and has made cotton for nearly twenty years. He paid him a large price—perhaps $2,000 a year to attend to his place—returned to Vermont and attended to his home business. He has a fine crop, and will make money.

In this case the real planter—the one recognized by Nature and by the cotton—is the overseer or superintendent, who with ceaseless vigilance "makes every thing move about him like clockwork" from daylight to the going down of the sun.

SECTION XI.

THE LABOR QUESTION—CAN THE WHITE MAN LABOR IN THE COTTON FIELDS?—HOW DO THE FREEDMEN WORK?—HOW WILL THE TWO CLASSES WORK TOGETHER?—WHAT IS THE PROBABLE FUTURE OF THE FREEDMEN?—COMPARATIVE ESTIMATE OF FREE AND SLAVE LABOR.

To the first of these questions we give an unhesitating affirmative answer, but it will require some explanation. The man unaccustomed to labor cannot stand the cotton field.

He may, possibly, train himself to it gradually, but the chances are against him. The white man, fresh from the North right in the heat of summer, cannot endure the labor; a few days' working will lay him up for the balance of the season. But the white man who has been raised to labor, more especially one who has been raised in the country, can endure it. Our young men who returned from the army, laid down the sword and the gun, and took up the plough and the hoe—they have found themselves to be as able in the cotton field as they were on the field of battle. They have *laid by* their crops, and will be soon ready for picking. They have been blessed with an ordinary share of health, and indeed bid fair to make splendid laborers.

Our "Northern brethren" also, as far as capacity for labor is concerned, appear to be doing nobly. They tug and toil, and pour out their sweat in copious streams over their small cotton and big grass, and demonstrate their physical manhood in a most satisfactory manner.

The laboring foreigner, too, is coming in and joining the great congregation of workers,—the German, the Frenchman, the Irishman, the Englishman, the Scotchman, the Swiss, and the Italian.

With proper care and prudence, the *Caucasian accustomed to labor* can work in the cotton field, though he cannot stand it as well as the *negro*. About one-third of the present laborers are white, the balance blacks.

In answering the second question, How do the freedmen work? facts alone must be our guide. We answer very briefly, and without any hesitation, when left solely to themselves, they do precisely as all the race have done who have gone before them. They sink down into idleness, filth, disease, and death. The report of Generals

Steedman and Fullerton, made during the past summer, is very satisfactory on this point. It is simply a second edition of McKenzie's "St. Domingo," in respect of the moral and industrial *status* of the negro, and his gradual descent from slavery, through freedom, to the grave.

On the other hand, we state with pleasure that wherever the negro has been controlled, put to work, compelled to work by contract, and has had the superintendence of a competent white man, he does well; the nearer he has been made to approach his old position of a slave, the better he has labored, and we believe it will always be so. The course of the late Congress, more especially in conferring civil rights upon the negro, is well calculated to arouse the worst fears of the Southern planter. The inevitable tendency of all their measures is to establish vagabondism, pauperism, pest-houses, crowded hospitals, walking nuisances, larceny, pillaging bureaux, negro effeminacy, epidemics, desolation, death. The end of these things is the extinction of the poor Africans, and the grand jubilee of their destroyers. May God stop them in their mad career! May a wise policy prevail, and may the freedman by judicious legislation of the State in which he lives, and the kind yet rigid discipline of his employers, live long in the land, and prove himself a useful laborer! We cannot well give him up. We can do better for him than any of his new friends. We know his wants, his wishes, his capacity; and, as we have accepted the abolition of slavery as a fixed and unalterable fact, we are now paying him for his labor, and endeavoring to allow him to work out his own salvation by our sincere coöperation.

We ask protection from the government. What is it? We ask "*to be let alone.*" This is all the protection we want. Shall we have it? The future of the freedmen, then,

may be thus stated: If the radical policy is carried out, they will degenerate and become extinct: if union measures prevail, just the very reverse of the radical policy, they will live, flourish, increase, and contribute by their labor to the wealth of the country.

In this connection we present the following remarks of Hon. J. W. Clapp, of Mississippi, made at the close of a valedictory address to the Trustees of the University of Mississippi, last July:

"The plan which would seem to be dictated alike by policy and true philanthropy is, that the two races here in the South should be left, without the *surveillance* and intermeddling of a third party, to work out together their respective destinies, and for each one to adapt itself to that level where the great law of moral gravitation will sooner or later inevitably place it. This plan, it is conceded, is, like every thing human, liable to abuse, and may give rise to instances of hardship and injustice; but if the two races are to live together, it is the only feasible mode by which collision and conflict can be avoided, the capacity of the negro for labor utilized, and he be rendered a comparatively respectable member of the community.

"But as the probability is that the policy adopted by the law-making power at Washington will be adhered to, by which the negro will inevitably become more and more unreliable and inefficient as a laborer, prudence, if not an imperative necessity, require that we should, in view of this contingency, make systematic and persevering efforts to fill up the channels of industry from other sources, and with those of our own color who can be assimilated and identified with us as a homogeneous element both of prosperity and power; treating the negro in the mean time with humanity and kindness, encouraging his mental and

moral culture, and extending to him without stint or grudging all the rights to which he is properly entitled in his new condition, but at the same time preserving with jealous pertinacity a social barrier between him and us that shall be impassable and perpetual, for upon this depends our preservation as a people from a fate more deplorable than extermination itself."

We sincerely hope that the apprehension expressed by the distinguished speaker will not be realized, and that the thunder is now preparing which will break in terrible fury on the heads of the traitors who have been trying to establish a despotism upon the ruins of the republic.

Let us hope for the best, labor and wait; and the time, we trust, will soon come when our labor will not be in vain.

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CHAPTER VI.

PRODUCTION AND EXPORTS OF COTTON—REMARKS ON THE GOVERNMENT TAX.

SECTION I.

PRODUCTION AND EXPORTS OF COTTON—STATISTICS—GREAT DEMAND FOR AMERICAN COTTON IN ALL THE MARKETS OF THE WORLD.

We propose now to notice the production of cotton in the Southern States for sixty years of the present century; to show the exports to all the great foreign marts for the four years beginning 1854 and closing 1857, as a probable average annual amount for twenty years preceding 1861; the shipments from Southern ports for one year (September 1, 1857, to September 1, 1858), as a fair sample of annual shipments for the same period; and lastly, the importations into England for six years, 1848 to 1853, from the United States and other cotton countries of the world.

The following table shows the quantity of cotton produced in the cotton States of the South, with the value of the same, from the year 1801 to the year 1860, inclusive:

YEAR.	Crop, lbs.	Price, cts.	Value, Dollars.	YEAR.	Crop, lbs.	Price, cts.	Value, Dollars.
1801.....	48,000,000	44	21,100,000	1831...	385,000,000	9	34,600,000
1802.....	55,000,000	22	12,100,000	1832..	390.000,000	9	35,100,000
1803.....	60,000,000	21	12,600,000	1833...	445,000,000	11	48,900,000
1804.....	65,000,000	24	15,600,000	1834...	460,000,000	12	55,200,000
1805.....	70,000,000	26	18,200,000	1835...	550,000,000	16	88,000,000
1806.....	80,000,000	25	20,000,000	1836...	570,000.000	16	91,200,000
1807.....	80,000,000	24	19,200,000	1837..	720,000,000	14	100,800,000
1808.....	75,000,000	17	12,700,000	1838...	545,000,000	10	54,500,000
1809.....	82,000,000	17	13,900,000	1839...	870,000,000	14	121,800,000
1810.....	85,000,000	17	14,400,000	1840...	654,000,000	8	52,300,000
1811.....	80,000,000	15¼	12,400,000	1841...	678,000,000	10	67,800,000
1812.....	75,000,000	9½	7,100,000	1842...	943,000,000	8	76,300,000
1813.....	75,000,000	10¼	7,500,000	1843...	812.000,000	6	48,300,000
1814.....	70,000,000	8¼	5,600,000	1844...	958,000,000	8	76,600,000
1815.....	100,000,000	20	20,000,000	1845...	849,000,000	6	50,400,000
1816. ...	124,000,000	30	37,200,000	1846...	710,000.000	8	56 800,000
1817.....	130,000,000	24	31,200,000	1847...	940,000,000	10	94,000,000
1818.....	125,000,000	30	37,500,000	1848...	1,000,000,000	7½	80,000,000
1819.....	167,000,000	25	41,200,000	1849 ..	860,000,000	6½	55,900,000
1820.....	160,000,000	17	27,200,000	1850...	890,000,000	11	108,900,000
1821.....	180,000,000	16	28,800,000	1851...	1,300,000,000	11	143,000,000
1822.....	210,000,000	19	39,900,000	1852...	1,400,000,000	8	112,000,000
1823.....	185,000,000	14	25,900,000	1853...	1,300,000,000	9	117,000,000
1824.....	215,000,000	15	32,200,000	1854...	1,200,000,000	8¾	105,000,000
1825.....	225,000,000	16	36,000,000	1855...	1,550,000,000	9	139,500,000
1826... .	246,000,000	13	32,000,000	1856...	1,300,000,000	9	117,000,000
1827.....	270,000,000	14	37,800,000	1857...	1,400,000,000	12½	175,000,000
1828.....	325,000,000	11	35,700,000	1858...	1,750,000,000	11½	199,000,000
1829.....	365,000,000	10	36,500,000	1859...	2,200,000,000	11¼	247,500,000
1830.....	350,000,000	9	31,500,000	1860...	1,650,000,000	11¾	198,000,000

The following table presents the quantities of cotton exported from the United States to the principal commercial countries for the years named:

COUNTRIES.	1854. lbs.	1855. lbs.	1856. lbs.	1857. lbs.
Great Britain.....	696,247,047	673,498,259	892,127,988	683,997,972
France	144,428,360	210,113,909	221,767,611	174,234,678
Spain.....	35,024,074	33,071,795	58,479,179	45,557,067
Hanse Towns.....	37,719,922	30,809,991	62,066,653	44,902,760
Belgium	13,980,460	12,219,553	23,171,784	12,247,423
Austria	14,961,144	9,761,465	6,034,452	7,614,592
Italy	12,725,880	16,087,064	20,854,867	17,239,859
Russia.....	2,914,954	448,897	4,643,384	31,933,534
Mexico.....	12,146,080	7,527,079	6,010,395	7,958,638
Holland	6,048,165	4,941,414	18,096,530	10,434,227
Sweden and Norway.....	9,212,710	8,428,437	17,289,637	10,088,095
British N. A. possessions.	72,790	883,204	4,158,530	857,490
Denmark	32,983	209,186	1,168,081	1,176,366
Cuba.....	250,633	9,620	4,950	2,000
Portugal.....	121,059	144,006	388,393	56,439
Elsewhere..... .	1,946,895	270,822	20,169,267	31,335
To all countries.....	987,833,106	1,008,424,701	1,351,431,701	1,048,282,475

The following table shows the shipments from Southern ports for the year September 1, 1857, to August 31, 1858:

FROM.	To Great Britain.	To France.	To Northern Europe.	Other Foreign Ports.	Total.
New Orleans	1,016,716	236,596	116,804	125,454	1,495,070
Mobile	265,464	89,887	21,462	10,219	387,032
Texas	33,933	1,689	14,716		50,338
Florida	25,771				25,771
Savannah	149,346	7,376	7,680	3,300	167,702
Charleston	192,251	35,508	33,126	38,524	299,404
North Carolina					
Virginia	495				495
Baltimore	164				164
Philadelphia	995				995
New York	110,721	12,951	20,308	3,841	147,821
Boston	14,110		1,549	4	15,663
Grand total	1,809,966	384,002	215,145	181,342	2,590,455
Preceding year	1,428,870	413,357	245,798	164,632	2,252,657
Increase	381,096			16,710	337,798
Decrease		29,355	30,653		

The quantity absorbed by the home market in 1856 was only about one-fifth of the entire crop—770,739 bales of 400 lbs. each, or 308,295,600 lbs. This amount, worth about $30,000,000, was, by a moderate estimate, made to produce about five times the sum by the industry applied to its manufacture in the New England and Southern factories.

The following table shows the importations into England in the years named from the United States and the other cotton countries of the world. The quantity is stated in packages, each package containing 300 lbs.

YEARS.	American.	Brazil.	East India.	Egyptian.	West India, &c.	Packages, total.
1848	1,375,400	100,200	227,500	29,000	7,900	1,740,000
1849	1,477,900	163,800	182,200	72,600	9,100	1,905,400
1850	1,184,200	171,800	307,900	79,700	5,700	1,749,300
1851	1,393,700	108,700	328,800	67,400	4,900	1,903,500
1852	1,789,100	144,200	221,500	189,900	12,600	2,357,300
1853	1,532,000	132,400	485,300	105,400	9,100	2,264,200

Mr. J. B. Gribble, of New Orleans, assuming that the average weight of packages of raw cotton to be, from the

West Indies, 173 lbs.; Brazil, 181 lbs.; Egypt, 306 lbs.; East Indies, 385; and the United States, 440 lbs.; then reducing all to bales of 400 lbs. each, arrives at this result: The product of the West Indies would be, for the year 1856, 4,090 bales; Brazil, 5,500; Egypt, 86,445; East Indies, 445,637; and for the United States, 3,880,580, or nearly seven-eighths of the product of the world.

The crop of 1860 was about 4,500,000 bales. Of this amount the home market took one-fifth, or 900,000 bales, leaving 3,600,000 bales for exportation. Of the amount exported, Great Britain took sixty per cent., or 2,160,000 bales; France, about 500,000; and the balance was distributed to the different states of Europe.

The "London Economist," after tracing the progress of the trade from 1838 to 1850, arrives at the following conclusions: That the supply of cotton from other sources than the United States has been irregularly decreasing; that, including the United States, the supply from all quarters available for home consumption has of late years been falling off at the rate of 1,000 bales a week, while the consumption has been increasing during the same period at the rate of 3,600 bales a week; that in the United States alone the growth is increasing, but limited there to about the same ratio as the increase of slaves, viz., three per cent. per annum; that this is barely sufficient to supply the increasing demand for its own consumption, and for the Continent of Europe; and that consequently, if this branch of industry is to increase at all on its present footing in Great Britain, it must be by applying a great stimulus to the growth of cotton in other countries adapted to the culture. The incapacity of other regions to supply the demand being shown, the writer looks to the British West India islands, and the African and Australian colonies, as

most likely to make up the deficiency under encouragement from the British Government.

From all the facts before us it is plain that, in the language of a late writer ("De Bow's Review" for August), "the South can defy the competition of the world in cotton growing." Whether "its former ascendency will be maintained and advanced under a system of free labor," remains to be seen.

By consulting our first table (p. 109), it will be seen that, with the exception of a few bad crop years, there was a gradual increase of production from 1801 to 1861, rising from about 50,000,000 lbs. to 1,650,000,000 lbs., or from 100,000 bales to upward of 4,000,000.

What was the simple reason of this increase? The increase of the laborers. In the year 1800 there were less than 250,000 slaves in the South. In the year 1860 there were 4,000,000. Now, suppose the government had never interfered with slavery, is it not reasonable to suppose that, with the gradual increase of the slave population, there would be an increase of cotton bales? Most assuredly. We venture the assertion that, inasmuch as the increase of the slave population from 1850 to 1860 was nearly one million, and the bales of cotton rose from 2,000,000 to 4,000,000, the year 1870 would exhibit an increase of the same population, making the entire number at least 5,250,000, and the number of cotton bales not far from 6,000,000.

Will free labor do as well? If life is spared, we shall see. Some of our readers will have the privilege of watching the progress of the new order of things. We sincerely hope, for the good of the country, that it may prove a success. We confess, however, that we are thoroughly and unchangeably pro-slavery, and every day confirms us in our faith.

SECTION II.

REMARKS ON THE GOVERNMENT TAX.

We propose, in this section, to consider the probable consequences of the late law of Congress, taxing raw cotton three cents per pound.

It is a law of trade, that the great markets of the world control and regulate the less. Liverpool is the great market of the world for cotton, and Liverpool prices will, consequently, regulate the prices of that article in all other markets. The three cents per pound tax on cotton in the United States cannot in any way affect the price of the article in Liverpool, only so far as it may tend to diminish the supply from this country, and thereby increase the demand there; but as there is a large and increasing supply thrown on the foreign market from the East Indies, China, Egypt, Brazil, and other countries, a diminution of the supply from the United States will surely stimulate the production of cotton in other countries. The vacuum produced by the diminished supply from the United States would soon be filled by the stimulated industry of other countries; and we should lose the compensating advantages of an increased demand which would otherwise result from diminished production in this country.

It is, therefore, clear that the whole weight of the tax falls on the producer of cotton in this country; that it will operate as a bounty to stimulate the production of cotton in other countries, to the amount of the tax; and that the effect will be to drive the American planter from the culture of cotton, unless it should command such a price in the foreign market as to make his labor remunerative, even with a discrimination *against* him of three cents per

pound, and in *favor* of his competitors in foreign countries to that amount. It will be seen, therefore, that the law operates as a protection, to the amount of three cents per pound, to the production of other countries, against the competition from this country; and that the law virtually imposes an enormous tax on our own citizens to build up the fortunes of the rival producers of foreign countries.

It is wise in any government to so shape its legislation as to promote the prosperity and happiness of its people. Contentment, and attachment to the government, will be the result. Possessing the means, they will have the will to defend it against all aggression; but partial laws, unjustly discriminating against one portion of the people, and in favor of another portion, will never fail to produce disquietude, and tend to alienate the affections of those aggrieved from their government. This fact has been most painfully illustrated by the terrible civil war through which we have just passed.

When cotton commands thirty cents per pound, a tax of three cents per pound amounts to ten per cent. on the entire gross proceeds; at twenty-five cents, the tax is twelve per cent.; at twenty cents, it is fifteen per cent.; and at ten cents, it is thirty per cent., or nearly one-third of the whole gross proceeds of the crop. Now, before the war, when cotton commanded from ten to twelve cents, he was considered a successful planter who realized six per cent. profit per annum upon the capital invested in its production. From this fact it will be perceived that cotton must bear an enormous price to enable the planter to realize any profit on his labor; and should the price decline materially, his labor would not only cease to be remunerative, but he would certainly be ruined by the business, and to avoid this he would abandon the pursuit.

What, then, let us inquire, would be the consequence to another great interest of the country? There are invested in the manufacture of cotton, chiefly in the North, several hundred millions of capital. Suppose the production of cotton to cease in this country, or to be so reduced as not to supply our mills, then our spinners would have to resort to foreign countries for their supply. Could they do this, and successfully compete with the manufacturers of Europe, when, even now, with the raw material furnished at home at much less expense than it would cost them from abroad, they are unable to compete with foreigners, without the protection of the government by a high tariff?

Again: the machinery of this country, I apprehend, is not adapted to the manufacture of the short-stapled cotton of the East Indies, China, or Egypt, and, to engage in the manufacture of that cotton, would have to be materially changed or abandoned, and new machinery instituted. The increased expenditure necessary to effect either of these objects would be overwhelming; which, added to the loss sustained by the lapse of time before the repairs of the old or the erection of the new machinery could be effected, would cause our manufacturers to abandon the business altogether. The vast capital invested would be partially if not wholly lost. Bankruptcy and ruin would overwhelm our "lords of the loom." Thousands and tens of thousands of operatives would be thrown out of employment, and pauperism and crime would present their haggard forms throughout the land.

Again: before the war, the cotton crop of the South was upward of 4,000,000 of bales of 400 lbs. each; say, 4,000,000 bales, or 1,600,000,000 lbs. At thirty cents per pound, the value of this cotton would be $480,000,000; and even at the low price of ten cents, its value was

$160,000,000. This, however, is too low an estimate. The crop of 1860 was worth, perhaps, $200,000,000. This amount in value was exported, and even at ten cents per pound furnished our merchants and manufacturers, in supplies and exchanges, with $200,000,000. But at thirty cents, as we have seen (and much of it has been sold above that price), it yielded for those purposes $480,000,000. Suppose this great basis of exchange to be stricken away, not only would our "lords of the loom" be ruined, but our supply of domestic cotton goods being cut off, necessitating largely increased importations from abroad, would increase the demand for exchange to the amount of such increased importations; while the supply of exchange would be $200,000,000 less than at present. Our whole exports, the last fiscal year, if I recollect right, including cotton, reached but little over half the value of our imports; leaving a balance of trade against us of, say, $200,000,000, which must be made up in gold. Take away the basis of exchange, furnished by cotton, and all the proceeds of gold from California and Australia together would be unable to meet the balances against us each year. The country would soon be drained of every dollar of its specie; paper, without a specie basis to sustain it, would be our only currency; and these paper promises to pay money, when known that there is no money to redeem them, would soon become utterly worthless. It is not difficult to perceive the consequences. Our diminished exchanges and diminished credit would force diminished importations. Diminished importations would cause diminished revenue, and necessitate the levying increased internal taxes. Decreased exports would cause diminished importations, and our navigation interests would to that extent be crippled. The mercantile, the manufacturing, and the shipping interests, would

reel and totter under the shock; and the government, with diminished revenues, and a public debt of $3,000,000,000, likely to be increased by the allowance of unsettled claims, and the reckless legislation of Congress, must let its credit sink; under which dreadful shock not only all the great interests of the country, but the government itself, will likely be involved in one common ruin.

It is objected by the South that the law in question is partial; that the agricultural productions of the North are not subjected to any such tax; that the North, which is rich—and, by the immense spoils taken from the South during the war, made still richer—is not taxed upon its agricultural productions; while the South, plundered of thousands of millions of its property—its plantations, cities, and towns laid waste by fire and sword—is so poor that it is a struggle for the people to live; and yet Congress, disregarding their crushed and ruined condition, has determined to discriminate against them, and tax them more than the entire net proceeds of their labor. Crushed as the Southern people are, they have not lost their manhood and self-respect. All experience proves that it is dangerous to trample too long on a proud and brave people. Sad, indeed, is the lesson on this point taught us by the late civil war. The white population of the South, including Maryland, Western Virginia, East Tennessee, Kentucky, and Missouri, at the commencement of the war, was about 8,000,000. If we subtract from this the number of loyalists (so called) in those States, with the scattering men of that caste in other parts of the South, I think it not far from the truth to say we had 5,000,000 of white persons true to the Confederacy; add these loyalists to the North, and it would swell the Federal population against us to at least 25,000,000, or five to one. In addition to

these, nearly 200,000 of our negroes were marshalled against us, as well as multiplied thousands from the vast tide of immigration from Europe that flowed in during the war. Yet this mighty power, with an established government, a regular army, a navy, machinery to manufacture all the appliances of war; with the inexhaustible granaries of the West to feed their armies, and all the world open to their shipping, by which they obtained all the munitions of war necessary to keep a million of men in the field, was resisted for four years by 5,000,000! These 5,000,000, before the war, had no established government, no army, no navy, no treasury, but a meagre supply of arms and ammunition, and, by the blockade of their ports, were shut out from all the world. They had to create the appliances of war; from raw militia create and organize armies for their defence; and yet, with all this disparity in men and means, they during four long years defended themselves with a valor and prowess scarcely equalled in the annals of history. Twice they carried the war into the enemy's country, and caused President Lincoln to tremble for the safety of his capital. The subjugation of these 5,000,000 by 25,000,000, with their foreign enlistments and 200,000 negro soldiers added, cost the North, in killed and wounded, and in death by disease, not less than 1,000,000 men, and not less than $4,000,000,000 of treasure. It has left the nation overwhelmed in debt, and produced a degree of demoralization in society the evils of which are incalculable.

And what produced all this? The South loved the Union of their fathers. They were proud of and gloried in the names of the statesmen and heroes which they had given to the Union. They had studied political science under such masters as Washington, Jefferson, Madison,

Monroe, and Jackson, whom they had given to the nation as Presidents; and they could boast of a Patrick Henry, a Randolph, a Pinkney, a Lowndes, a Calhoun, a Hayne, a McDuffie, a Clay, and a long line of illustrious statesmen that had adorned the annals of the country. They had more than borne their part in all the wars for the defence and for the maintenance of the honor of the country. Why, then, I again ask, did they, by secession, attempt to leave the Union? I answer, because the North had, as they thought, unwarrantably intermeddled with their interests—interests secured to them by the constitutional compact. Because they saw the North treat with contempt an opinion of the Supreme Court, deciding the territorial question in their favor; and because the North had elected a President and Congress pledged to carry out the policy of excluding them and their property from a participation in the enjoyment of the common property of the nation. They saw, or thought they saw, a fixed determination on the part of the North to deprive them of their rights, in violation of the compact of union; and they attempted to withdraw the powers they had conferred upon an agent that was abusing its trust. For attempting this, the North waged war upon them.

Now, we will not stop to inquire whether the South was right or wrong. There can be no doubt but that they thought they were right. They never would have left the Union which they loved, if they had not believed that the life, the soul of that Union was gone; and that a dead, putrefying carcass, *called "the Union,"* only remained. The Union was only valuable because, while it existed according to the Constitution, it was the bulwark of our rights and liberties. See the deplorable consequences resulting from a policy that produced alienation from a

government which we once loved. Never would the South have thought of adopting the painful alternative of secession, or of abandoning the Union, had they not been alienated in their affections from it by the violation of the constitutional compact, as they believed, by the majority who controlled the government. They had a firm conviction that there was a determination on the part of that majority to wrong and oppress them. The consequence was, secession of eleven States, and a long, bloody, and disastrous war.

The South never desired more of the North than a faithful observance of the constitutional compact. And now, after all that has passed, give them their constitutional rights, and they will again be the most devoted friends and defenders of the Union. Continue to deny them these, seek to humble and degrade them, impose on them unequal burdens, tax them without allowing them a voice in the government, and you will again rouse the spirit of '76. You will keep alive and fan their resentments to a flame. They will be led to despise the government which they once loved, and, like oppressed Ireland, will watch with sleepless vigilance for a favorable opportunity to throw off the oppressor's yoke.

The United States will be fortunate indeed should they escape war in the future with one or more of the great nations of the earth; and should such war come, it will be much safer to have the good will of a brave people than their enmity.

The South would not complain of a moderate tax on cotton, one which they could pay, provided the agricultural products of the North were taxed in the same proportion; but they are unwilling that the rich North shall enjoy an exemption, which, in their impoverished condition, strug-

gling for their very existence, is denied them. Their State treasuries are empty, and must be replenished; they have thousands of helpless widows and orphans, and maimed and crippled men to support; and, owing to the ruin and desolation caused by a vandal enemy, those once in affluence are mostly reduced to poverty. All the business pursuits of life have been thrown into confusion by the destruction of their former organized system of labor. Half the negroes will not work at all, or, if they do, it is to no valuable purpose. Under these circumstances, it is not only unjust but it is heartless cruelty to levy a partial and enormous tax on their chief means of support. This tax will operate peculiarly hard upon the poor negro. A large majority of the negroes engaged in planting have formed partnerships with their employers, and are to receive, in some cases, one-third, but in most cases one-half, of the crops. The industrious among them are struggling to make a "start in the world;" but if they have to pay fifteen dollars tax on every five hundred pound bale they make, they will have little or nothing left, after defraying the enormous expenses of living the present year. Indeed, many of them will be left in debt. The result will be, dissatisfaction with their condition, and they will sink into discouragement. They will find the fancied boon of freedom like the apples of Sodom, beautiful to the sight or in the imagination, but dissolving to ashes upon the touch. Will not our Congress do something to relieve them? Surely if they have no sympathy with or compassion for the suffering *whites* of the South, they will do something to relieve their *colored* brethren.

The intention of the framers of the Constitution was to form a Union founded on justice, and on equality of rights, privileges, and immunities among all the parties to the

compact; that of the benefits to be derived from the government, each State and the citizens of each State should be entitled to equal participation; and that of the burdens of government, each State should bear its just proportion. They also intended that if an immunity were allowed to the people of one State, the people of all the States should be allowed the same or a like immunity. In proof of this, we invite attention to a few clauses of the Constitution:

1. "We the people of the United States, in order to form a more perfect Union, *establish justice*, insure the public tranquillity, and to secure the blessings of liberty to ourselves and posterity, do ordain and establish this Constitution."

Is the taxing of cotton, produced only in the South, while the agricultural productions of the North are not taxed at all, doing equal *justice*, and calculated "*to insure domestic* tranquillity"?

2. "Representatives and direct taxes shall be apportioned among the several States, which may be included within this Union, according to their respective numbers."

The British Government levied a tax upon the colonies, while they were excluded from representation in Parliament. In opposition to this injustice, and in defence of the great principle that taxation and representation should go together, the Revolutionary War was fought. With a view to prevent this abuse of power on the part of Congress, in reference to "*the several States of the Union*," and to secure equal justice in the levy of taxes, the last-quoted clause was inserted.

From the fact that the right of representation and the power of direct taxation are coupled together in the last-quoted clause, it is obvious that the intention of its

framers was to prevent the wrong of taxation without representation (imposed on the colonies by the British Government) from being perpetrated by Congress on any of the States of the Union. And when a direct tax should be levied by Congress, it was provided that it should be apportioned among all the States in a ratio proportioned to the population; and that no discriminating tax should be levied on one portion of the people, or on one State, or one section of the Union, and not on another.

3. "The Congress shall have power to lay and collect taxes, duties, imposts, and excises, to pay the debts, and provide for the common defence and general welfare of the United States; but all duties, imposts, and excises, shall be *uniform throughout* the United States."

This clause fully sustains my views on the preceding clause, by requiring *all duties, imposts, and excises*, to be UNIFORM THROUGHOUT the United States.

4. "No tax or duty shall be laid on articles exported from any State."

Cotton is almost wholly *exported* from the Southern States to find a market, and the above clause positively prohibits a tax on all articles that may be exported.

5. "The citizens of each State shall be entitled to all privileges and immunities of citizens in the several States."

That is, if under the Constitution the citizens of *any* State enjoy certain privileges, the citizens of all the States shall be entitled to enjoy the same. If the citizens of *any* State are allowed an immunity, the citizens of *all* the States shall be entitled to the *same* immunity. How could Congress, if they had any regard for the Constitution which they were sworn to support, in view of the two last-quoted clauses, levy this unjust tax upon an "*article of export*," and grant an immunity from taxation to the agricul-

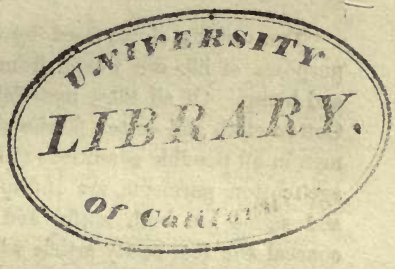
tural productions of the North, while they tax enormously the chief agricultural product of the South?

From the views just presented, and from the clauses of the Constitution quoted to support them, I think that every candid mind must decide that the tax law referred to is clearly and grossly unconstitutional, and therefore void.

We will close this section by an appeal to the sense of justice which we hope still remains with a majority of the Northern people. We invoke the sympathies of our common humanity, and call upon you to use your best efforts at the ballot-box, and by the force of public opinion to correct the evil of which we complain. In electing members of Congress, we implore you to select men who are worthy of the name of statesmen—men who understand the Constitution of their country, and whose sense of moral obligation will insure its faithful observance—men of pure morality, high-toned honor, lovers of their country, their whole country—patriots who will zealously labor to promote justice, peace, good will, and prosperity throughout the whole country—men free from sectional hate, and a blind and frenzied fanaticism. It is useless to make any appeal either to the justice, the magnanimity, the mercy, the wisdom, the prudence, or the patriotism of the ruling majority in Congress. I apprehend that it will require a larger intellectual microscope than any philosopher or statesman of the present day possesses to find much, if any, of those desirable qualities in the leaders who control the present Congress. But to you, the masses of the Northern people, to you who have not lost your senses under the stupefying and maddening influence of a wild and frenzied fanaticism—you who love the Union of our fathers, and regard the Constitution as the bulwark of freedom, the palladium of our safety, and the sheet-anchor of

our hope, to you we appeal. Are you willing to utterly crush and ruin a people by unjust and unconstitutional legislation, who have been robbed and plundered of nearly all they possess? Could you see our once well-cultivated farms now changed into a gloomy, desolated waste; our once well-stocked plantations, now almost entirely destitute of horses, mules, cattle, hogs, sheep, &c., and behold the lonely chimneys and charred remains of our once smiling cottages and stately mansions, sad mementoes of the past and reminiscences of happier days; could you see the gray-haired sires and matrons bending under the weight of years, reduced to poverty by the ruthless hand and torch of the invader, toiling from morn to eve to sustain the helpless widows and orphans of their murdered sons; could you see our whole people struggling as it were for life against the rolling surges of adversity, surely you would frown upon all attempts to further injure them. And as philanthropists and Christians, will you not mingle your sympathies with ours for the poor negro, who is now just entering on a new and untried scene of his being, and who needs, greatly needs the fostering care instead of the crushing power of the Government? How is it possible that he can live and support his family at the present enormous price of clothing and provisions on one-third or one-half of the proceeds of his labor, pay his medical accounts, his State and county taxes, necessary contingent expenses, and ten, perhaps thirty per cent. of the value of his crop to the Federal Government, and have any thing left? Is it for the interest of the country, either North or South, to keep this unfortunate race in poverty, and fill the country with pauperism and crime? Surely not. And yet the tendency of this iniquitous and unwise tax law is to produce that result.

And now, in conclusion, I will only add, that I trust I have satisfactorily shown that the law in question is impolitic, unwise, unjust, cruel, unmerciful, and unconstitutional; and I hope that all lovers of justice, all who are attached to their country and its institutions, and who desire to save the Government from committing political suicide, will rally to the rescue, hurl from the places they disgrace the incompetent, fanatical, and revengeful squad that are leading the country to ruin, and put in their stead statesmen—patriots who love their country, their whole country, and who will labor assiduously to heal the festering wounds left by the late unhappy war, promote peace and good will, and conduct our beloved country on the high road which leads to glory, prosperity, and happiness.


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CHAPTER VII.

MANUFACTURE OF COTTON.

SECTION I.

TEXTILE FABRICS.

The various cloths used by civilized men for all the purposes of life are woven from cotton, wool, silk, flax, and hemp. Of all these materials, the greatest is cotton. Cotton cloth and cotton fabrics of every style are worn by men in all possible conditions of life. From infancy to old age cotton garments are indispensable; and while silks and satins are both useful and ornamental, they always conceal the less costly article which is worn alike by the rich and the poor.

The following list shows the different classes of cotton goods manufactured in this country and in Europe: Linseys, Osnaburgs, calicoes, ginghams, webbing, drills, ticks, duck, sheeting, shirting, jeans, denims, cottonades, flannels, Silesians, kerseys, laces, edgings, insertings, cambric, fringework, &c. It enters also into the fabrication of velvets, silks, satinets, broadcloths, and linen; and to what extent art and science may carry its uses time alone can tell.

HISTORY OF THE COTTON MANUFACTURE.

A few remarks on the history of spinning and weaving machines will not be out of place.

One hundred years ago James Hargraves invented the *spinning jenny*, in which eight spindles at first were set in a frame and made to spin as many threads at one operation, the ends passing from the spindles through a fluted wooden clasp which was held in the left hand, and could be made to close upon the threads and hold them fast as it was moved to and from the spindles. The number of spindles was afterward increased to eighty. Richard Arkwright soon afterward came forward with a new invention of spinning by rollers, the effect of which was to draw out the rolls as they came from the carding machines, and by the slight pull elongate and straighten the fibres left crooked or double in the carding. By combining several fleeces or card ends and passing them through together, and causing them to unite in one roll, a fleecy ribbon is obtained of great uniformity, and by repeating the process the quality is still further increased. From this fine, uniform roll, Arkwright produced an even and firm thread, suitable as well for the warp as the woof. About the year 1770 he built the first mill in which the machinery was run by a water-wheel. Factories were afterward rapidly established throughout England. The first machines for carding and spinning were made in the United States in 1786. The Beverly Company commenced operations in Massachusetts in 1787, and they succeeded in manufacturing cotton goods, but with very imperfect machinery. In 1788 the Providence (R. I.) Company commenced making homespun cloth, but their machinery was also imperfect, and they

made slow progress. In 1790 the first Arkwright machinery was set in operation, and a new impulse was given to the manufacture of cotton. From 1800 to 1815 the number of bales consumed increased from 500 to 90,000. Up to the year 1813 cloth was woven by the hand loom, and at this date about 100,000 operatives were employed and $40,000,000 invested in the business. During this year Francis C. Lowell built a factory for about 1,700 spindles, and furnished it with power looms for weaving. The first cotton mill in Lowell was erected in 1822. Thirty years afterward twelve manufacturing companies were in operation there, whose mills, amounting to fifty-one in number, extended in a continuous line of about a mile. From that time to this mills have been on the increase in the New England States, and many have been erected likewise in the South and West, giving employment to thousands of operatives, contributing largely to the wealth of the country, and sustaining commerce with foreign nations.

SECTION II.

COTTON MANUFACTURES IN THE UNITED STATES.

The table on page 129 shows the amount and valuation of cotton manufactured in the United States, with the reported number of mills, looms, and spindles, the variety of manufactured articles and their valuation, for the year 1857. Not one-third of the mills, however, are reported, as will appear from the next table:

The table on page 130 shows the total number of cotton establishments, according to the census of 1850, the capital employed, the cotton used, the hands engaged, and the value of the manufactured articles.

STATE.	Mills.	Looms.	Spindles.	Cotton Consumed, lbs.	Goods Manufactured.		
					Class.	Quantity, yds.	Valuation.
Alabama	8		12,000	1,500,000	Linseys, Osnaburgs, sheeting, shirting,	2,500,000	$3,000,000
Connecticut	20	1,500	60,000	8,000,000	Ginghams, cottonades, calicoes, ticks, sheeting, shirting,	23,000,000	3,700,000
Delaware	2			700,000	Ticks, drills, sheeting, shirting, &c.,	2,000,000	160,000
Maryland	1			280,000	Drills, sheeting, and shirting,	860,000	63,000
Mississippi	1			135,000	Linseys and Osnaburgs,	280,000	70,000
Massachusetts	61	15,000	500,000	81,000,000	Calicoes, sheeting, shirting, drills, cottonades, ginghams,	255,000,000	22,750,000
Maine	10	2,000	75,000	13,700,000	Prints, sheeting, shirting, jeans, flannel, &c.,	38,000,000	2,500,000
New Jersey	5			1,500,000	Sheeting and shirting,	1,700,000	170,000
New Hampshire	30	8,000	300,000	45,000,000	Sheeting, shirting, prints, flannels, drills, and ducks,	118,000,000	7,600,000
New York	15			4,600,000	Sheeting, shirting, prints,	16,800,000	1,000,000
North Carolina	5		20,000	1,000,000	Linseys, Osnaburgs, sheeting, and shirting,	600,000	100,000
Pennsylvania	4			5,000,000	Sheeting, shirting, &c.,	7,000,000	1,100,000
Rhode Island	15	3,000	60,000	4,500,000	Prints, satinetts, sheeting, shirting, &c.,	17,500,000	1,600,000
South Carolina	2			2,000,000	Osnaburgs, sheeting, shirting,	5,500,000	450,000
Tennessee	3			560,000	Osnaburgs,	450,000	45,000

STATES.	No. of establishm't's.	Amount of capital invested.	Bales of cotton used.	Value of raw material.	No. of males employed.	No. of females employed.	Average wages of males per month.	Average wages of females per month.	Value of entire products.
Maine	12	$3,329,700	31,532	$1,573,110	780	2,959	$29 35	$12 15	$2,596,356
New Hampshire	44	10,950,500	83,026	4,839,429	2,911	9,211	25 45	13 47	8,830,619
Vermont	9	202,500	2,243	114,415	94	147	15 55	12 67	196,100
Massachusetts	213	28,455,630	223,607	11,289,309	9,293	19,437	23 01	13 55	19,712,461
Rhode Island	158	6,675,000	50,713	3,484,579	4,959	5,916	18 61	12 95	6,447,120
Connecticut	128	4,219,100	39,483	2,500,062	2,708	3,478	19 08	11 81	4,257,522
New York	86	4,176,920	37,778	1,985,973	2,632	3,688	18 33	9 68	3,591,989
New Jersey	21	1,483,500	14,437	666,645	616	1,096	17 98	9 56	1,109,524
Pennsylvania	208	4,528,925	44,162	3,152,530	3,564	4,099	17 86	9 91	5,322,262
Delaware	12	460,100	4,730	312,068	413	425	15 55	11 59	538,439
Maryland	24	2,236,000	23,325	1,165,579	1,008	2,014	15 42	9 53	2,120,504
Virginia	27	1,908,900	17,785	828,375	1,275	1,688	10 15	6 98	1,486,384
North Carolina	28	1,058,800	13,617	581,903	442	1,177	11 66	6 13	831,342
South Carolina	18	857,200	9,929	295,971	399	620	13 94	8 30	748,338
Georgia	35	1,736,156	20,230	900,419	873	1,399	14 57	7 39	2,135,044
Florida	...	80,000	600	30,000	28	67	32 14	5 00	49,920
Alabama	12	651,900	5,208	237,081	346	369	11 71	7 98	382,260
Mississippi	2	38,000	430	21,500	19	17	14 21	5 84	30,500
Louisiana	...								
Texas	...								
Arkansas	3	16,500	170	8,975	13	18	14 61	5 88	16,637
Tennessee	33	669,600	6,411	297,500	310	581	10 95	6 42	510,624
Kentucky	8	239,000	3,760	180,907	181	221	14 62	9 36	273,439
Ohio	8	297,000	4,270	237,060	132	269	16 60	9 05	394,700
Michigan	...								
Indiana	2	43,000	675	28,220	38	57	13 00	6 77	44,200
Illinois	...								
Missouri	2	102,000	2,160	86,446	75	80	10 94	10 00	142,900
Iowa	...								
Wisconsin	...								
California	...								
District of Columbia	1	85,000	960	67,000	41	103	14 02	8 01	100,000
Total	1,094	$74,501,031	641,240	$34,835,056	33,150	59,136	$16 77	$9 18	$61,869,184

SECTION III.

THE COTTON MANUFACTURES OF EUROPE.

GREAT BRITAIN.—This nation ranks first among foreign countries in the manufacture of cotton fabrics. Prior to our civil war she took from forty to sixty per cent. of the exports of the American crop; and some idea may be formed of the extent of her manufactures when it is stated that their amount in number and value will more than double those of the United States. Her fabrics are good and substantial, though not quite so fine and beautiful as those of the Continent. She runs 21,000,000 spindles.

FRANCE.—This nation ranks next to Great Britain in the quantity and value of the cotton consumed, while the variety of articles into which it is fabricated is much greater. In the taste and beauty of her tissues she justly claims the first place among modern nations. Her mills send forth every description of cotton goods—from the common calicoes of Rouen to the richly figured muslins of Mulhouse, the gossamer tulles of Saint Quentin, and the exquisite tarlatans of Tarare.

The fine cotton tissues of French fabrication are calicoes, Indiennes, percales, ginghams, madopolain, jaconet, organdie, figured muslins, printed muslins, handkerchiefs, shawls, tulles, bobinets, laces, bonnetine (caps, under-shirts, drawers, gloves, &c.), fringes, and nankeens.

Two thousand and forty establishments consume raw material valued at $38,395,372. Their operations, by the aid of 212,000 workmen and 113,000 machines, increased this value to $61,000,000. The following summary presents an outline of the different branches of cotton manu-

facture in France, after the raw material has been converted into yarn or thread:

1. *Tissues of pure Cotton.*

Number of establishments	1,484
Value of the spun cotton used	$18,384,806
Value of the tissues fabricated	$30,448,200
Total number of hands employed	145,474
Wages of these hands	$6,750,000
Looms	92,623
Spindles	190,336
Profits, wages, and general expenses	$12,090,000

2. *Transparent Tissues, embracing Tulles, Laces, and Embroideries.*

Number of establishments	46
Value of raw material	$1,000,000
Value of products	$2,700,000
Number of hands	17,400

3. *Bleaching, Dyeing, and Printing Establishments.*

Number of every kind	290
Value of raw material	$11,292,000
Value of products	$16,500,000
Number of hands	18,000

4. *Mixed Cotton Tissues.*

These embrace cotton and wool velvets; cotton and wool blankets; cotton, wool, and flax fabrics; cotton and silk; cotton, silk, and wool.

Total number of establishments	195
Value of raw material	$6,960,000
Value of products	$10,290,000
Number of hands	26,000

As an evidence that American cotton is prized more highly in France than any other, it is sufficient to state that the average annual importation into that country for ten years, including 1851 and 1860, amounted to 180,000,000 pounds. Of this amount 160,000,000 pounds came from the United States, and the remaining 20,000,000 from all other countries.

SWITZERLAND.—The number of cotton spinning mills in Switzerland is 132; the number of weaving mills, 48; spindles, 1,100,000; looms, 7,800; number of pounds of raw cotton imported, about 30,000,000. Fine muslins are the leading articles manufactured.

RUSSIA.—The empire of Russia has kept a nearly equal pace with the other Continental states in the increase of consumption and manufacture of cotton. Before our civil war Russia was receiving about 125,000 bales, or 56,000,000 pounds.

There were in 1860 about sixty cotton spinneries, having 1,250,000 spindles, and employing nearly 60,000 hands. Weaving, dyeing, and printing cotton stuffs occupied four times that number of people. The tissues fabricated are calicoes, mitrales, percales, nankeens, Indiennes, shirtings, and Persiennes. The manufacture of fine tissues is very limited. The value of cotton tissues is about 65,000,000 silver rubles. Nearly all of their tissues are consumed in the country, a small quantity only being exported to Asia.

There are large manufactories of cotton in *Austria*, *Sardinia*, *Belgium*, and the *Zollverein States*, of which we cannot now speak particularly.

It affords us pleasure to present to the reader the following remarks, made by Mr. Claiborne to Jacob Thompson, Secretary of the Interior, in the year 1858:

"In conclusion, it may be said that it would be difficult to over-estimate the importance of cotton in the movement of the industry and commerce of the civilized world. Since the inventions of Arkwright and Watt, in England, and Whitney, in our own country, its manipulation and fabrication have become so comparatively easy and cheap, and its adaptation to supply the wants or the luxuries of man have proved to be so multifarious, that the question of an adequate supply of it to the growing demand has become one of the very highest importance, being exceeded in interest by that of the cereals alone. Its influence in the well-being of the masses by furnishing employment, sustenance, and cheap clothing, has long since been fully admitted; and such has been the impetus afforded by it to the invention and improvement of manufacturing machinery, that, in his work, before quoted, M. Audiganne remarks that 'it was certainly a curious sight, that of the different aliments afforded by cotton to labor, and the services rendered to man at this day by this substance, of which the consumption has increased tenfold four or five times in less than sixty years. Cotton is manufactured among the greater part of the nations that figured at our side in the Palace of Industry. Nearly all had sent there samples of their fabrication—samples more or less numerous, more or less remarkable, but always worthy of attentive examination. *The degree of advancement of each people in the career of industry might be measured by its skill in the treatment of cotton.*'

"Illustrating its commercial and political influence as between the United States and Great Britain, Dr. Engel

says of it, 'that England and the United States are bound together by a single thread of cotton, which, weak and fragile as it may appear, is, nevertheless, stronger than an iron cable.'

"No wonder, then, that the question of the adequate supply of this mighty and all-powerful agent soars at this day so far above many which, at the beginning of the present century, far outranked it in their bearings upon the interests of civilized man; and it may not, in this connection, be deemed out of place to allude, briefly, to the history of the supply in Great Britain, which has long been the principal receiver of the raw material, not only to meet her own growing demands, but to be distributed, to some extent, among those European countries which commercial supremacy has made tributary to her.

"Cotton planters and manufacturers are alike under great obligations to Joseph Rudworth Sharp, F. H. S., of London, for his valuable tables, published in September last, which exhibit in a clear and comprehensive manner the gross amount of receipts per year, with quinquennial averages, and the countries of production of the cotton received in the United Kingdom, &c., from the year 1821 up to 1855. These tables are admirably arranged, and must have cost an immense amount of labor to their compiler; and with full acknowledgment of the very great aid they have been to me, the second of them is annexed hereto, as affording, in a clear and succint form, the best information attainable on that subject.

"It will be seen from this statement how vast has been our own contribution of the raw material to Great Britain and Europe generally, and how much more reliable as a source of supply our cotton fields are than those of any or all other countries, as their production between 1851 and

1855 was five times that of the East Indies; and that, while during that period, all other countries exported to Great Britain 937,024,275 pounds, our own sent her 3,424,502,024 pounds, or more than three and a half times as much.

"In his first table, Mr. Sharp sets down the import from the United States into the United Kingdom, in 1856, at 780,040,016 pounds; that from the East Indies at 180,496,624 pounds; and the total from all other countries than the United States at 243,846,512 pounds, leaving a balance in our favor of 536,193,504 pounds, and also showing that in that year also we contributed more than three times as much to European supply than all other countries combined, while it must be remembered that our domestic consumption was advancing so rapidly as to require for its use 652,739 bales, which estimated at 450 pounds each, were equal to 293,732,550, or more than the import into England that year from all other countries than our own.

"Mr. Samuel S. Littlefield, editor of the New Orleans 'Price Current,' than whom there is no better informed or more reliable authority on the subject of cotton and the cotton trade in the Union, estimates the value of our crop of 1857 at 2,931,519 bales, after making all allowances for differences in their weights in different sections of the country, at an average of $50 per bale, making the total sum of $146,975,950. This gentleman has also furnished me with much interesting information, and several valuable suggestions.

"From what has been said under the various heads of this report, the following conclusions as to the influence of raw cotton among the nations who are our chief customers for it may be drawn—

1. "That it contributes vastly to their social well-being by furnishing labor, sustenance, and cheap and comfortable clothing to many thousands of their subjects or citizens.

2. "That to commerce, it contributes immensely by furnishing a great variety of articles, by which its exchanges are in a considerable degree regulated, and large profits continually realized. That to capital, it offers the means of profitable investment and returns, and aids greatly in its accumulation.

3. "That its political influence arises from the fact, that, by opening and extending commercial relations between different nations, it has created sympathies and ties of common interest, which make the policy of peace and its attendant blessings far more easy to maintain than was once the case; that it adds to the national wealth and resources, and by furnishing employment and support to many thousands who might otherwise be without either, it makes contented those who would, through idleness or suffering, become burdens to the State.

4. "That the permanent and adequate supply of raw cotton thus becomes to Great Britain and Continental Europe a subject of vital importance, and indeed of absolute necessity; and that any considerable diminution in the crop of the United States would cause the gravest inconveniences, while the occurrence of any state of things whereby it should be entirely cut off would be followed by social, commercial, and political revulsions, the effect of which can scarcely be imagined."

MANUFACTURE OF COTTON BY ITS PRODUCERS.

Suggestions of S. R. Cockrill *seventeen years ago, commended for Reflection of Capitalists in* 1866.

The spindles and looms must be brought to the cotton fields. This is the true location of this powerful assistant of the grower. In the West, in the East, or in the North, would be better than any foreign country; but the *best* location is the sunny South, where the cotton grows. The next best location is in the provision regions nearest the South.

The inequality between the labor and capital for growing and that for spinning is startling. A pound of cotton, ploughed, hoed, picked, ginned, baled, spun, and wove, is worth eighteen cents. The spinning and weaving, it is said, can be afforded for three cents cost, which would leave fifteen cents per pound for the labor of the planter, supposing the cotton mill in the cotton field, and the mill to get cost only; but as three cents may be too low an estimate, make it six, and then twelve cents is left for the planter. But now, what does he get? Four, five, and six. The question may now be asked, Who gets the balance? Allowing six cents to the grower and six cents to the spinner, there will be six cents yet unaccounted for. It goes to pay warehouse charges, freight, insurance, drayage, storage, weighage, *pickages*, pressage, commissions, postage, bills of lading, exchange, freight to Liverpool, dock dues, freight on railroad to Manchester, and then it is at the mill, and the same process brings it back, and this will fully account for the six cents a pound. Who pays these charges? *The grower.*

The growth and production of cotton are accomplished by the muscles of men and mules, laboring incessantly

eleven months in every twelve; exposed to heat, to cold, to wind, and rain, and to the malaria of swamps.

The spinning and weaving are done by the iron muscles of the spindle and loom, driven by the never-tiring engine, waited upon by boys and girls; and this labor is under roof, certain as to *quantity*, free from overflow, from frost, from caterpillar, and from boll-worm. This simple statement is evidence, clear and strong, that it is the grower's labor which is now sacrificed, and greatly sacrificed. A firm and determined resolution among the planters, for they are the men who are suffering, and they must act for themselves, can arrest this policy in a few years. An export duty on "raw cotton" would insure it, but it may be accomplished without it.

Having determined that *the mills must come to the cotton*, which is but one move, whilst sending the cotton to the mills is a heavy annual, perpetual tax, it is proper to inquire if cotton growers can get up the spindles and looms among the fields.

The following facts answer the question in the affirmative most distinctly. We estimate the crop at 2,300,000 bales. The factories now in the United States require of this 600,000 bales—leaving 1,700,000 for the South to spin. This would require 350 mills, with 10,000 spindles each, or 700 mills with 5,000 spindles each, or 3,500,000 spindles.

Cost of Spindles.

3,500,000 spindles, with all machinery necessary, looms, &c., at $12	$42,000,000
700 engines and fixtures, at $8,000	5,600,000
Other expenses in and about the machinery.	5,000,000
Total	$52,600,000

The machinery, if all purchased in one year, would cost about $50,000,000. This is the only debt of importance necessary to be made, and its payment can be extended into ten instalments of $5,000,000 each, interest added. The difference in the income of cotton growers when they become spinners is so great that this debt would never be felt. The 1,700,000 bales intended for the cotton-field spindles, now yields an income of $40,000,000 at six cents. The same cotton spun up, by the creation of the above debt, by these iron muscles, will give the same growers an income of $120,000,000, less the cost of spinning and weaving, which would give an increase of net gain per annum nearly equal to the cost of the machinery.

One mode here suggested is, for planters, provision growers, and mechanics of all the cotton States to send in petitions for manufacturing companies to be chartered, upon application to the Legislatures of their respective States; and also to pass an act for a general charter for all persons who may associate together for manufacturing purposes, so as to avoid partnerships, and limit the liability of stockholders to the loss of their subscriptions as stock.

Spinning may be commenced with any number of spindles, with or without looms. There is an extensive demand for cotton yarns, and thread is a salable manufacture. The mills at Lowell average about 6,000 spindles for each building. There is one, however, at Salem, containing 30,000 spindles, the largest in the world under one roof. The size of buildings, then, will depend upon the quantity of machinery intended to be worked. A mill for 2,500 or 3,000 spindles, for coarse goods, will require, perhaps, three rooms, twenty-five by sixty feet long; and a plan suitable for the *cotton-field system*, which will be in the country, and where land costs nothing, and manageable

by slave labor, at comparatively *no cost*, is for fifteen planters to take $4,000 each in stock, select a site for the mill near their plantations, detail three men from each, making a building force of forty-five men, besides an overseer and a general manager, one of the stockholders. With this force, and as many teams as may be necessary, they will proceed to put up three rooms of twenty-five feet by sixty feet, of wood, one story high, of coarse, strong, undressed lumber, such as they can readily prepare from the forest, without an outlay of capital. Add at convenient distances fifteen or twenty cabins, and the buildings for the mill are up. This wooden, one-story plan for the cotton field possesses the advantages of costing nothing, of fixing and running the whole machinery upon the ground, making it more steady and accessible, and avoiding wear and tear, with better ventilation, less noise, and perhaps less risk from fire, because it is not the walls of a mill, but the cotton about machinery, which is liable to burn.

We see no good reason why the views of Mr. Cockrill may not be adopted by our planters, and we commend them to the serious consideration of all our readers who feel a real interest in the prosperity of the country.

We are happy to state in this place that the number of cotton manufacturers in the South is now greatly on the increase. Georgia seems to be taking the lead. Nearly one hundred mills will be in operation in the old Empire State by the first of November next.

Mississippi, too, is building large factories. About twenty are already erected, and several more projected. Alabama has about thirty; North Carolina, thirty-five; South Carolina, twenty-five; Tennessee, thirty-five; Louisiana, five; Texas and Arkansas not heard from.

We do not give these numbers as absolutely correct. Our statements are made from the best information we can obtain.

We are going to work in good earnest, not only to repair the waste places of the war, but to build up and improve and prosper, and to show to the world that we can be as good soldiers in peace as we are in war; and that we intend to achieve some most glorious victories on the fields of labor and in the chambers of commerce.

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CHAPTER VIII.

CONSUMPTION OF COTTON.

We restrict the phrase "consumption of cotton" to the actual wear and tear by the millions who are compelled to use it. A man of calculating mind may form some idea of this immense consumption by beginning his reckoning in his own family. How many yards of common domestic are required to clothe a single person for a year? Twenty-five yards is not too large an estimate as a fair average for old and young; adult women requiring fifty yards, and small children from fifteen to thirty. How many persons are there in the United States requiring cotton cloth? 30,000,000. Then it will require 750,000,000 yards. This calculation does not include the fine cambrics, muslins, laces, &c., of foreign importation.

Let us extend our calculations across the water. Let us suppose that England takes annually 2,000,000 bales, or 900,000,000 pounds. This will make 1,800,000,000 yards of cloth. A larger portion of this cloth is designed for clothing, and is distributed to all parts of the world, to be worn out or *consumed* on the backs of the needy myriads.

France takes 500,000 bales, or 225,000,000 pounds. She converts it mostly into fine fabrics, such as laces and tulles. Supposing one pound of cotton will make four yards

of fine tissue, then it appears that France weaves 900,000,000 yards of extra fine cotton cloth, a large portion of which she consumes herself; the balance being used up chiefly by England and the United States.

The usual estimate of the consumption of cotton in the United States and England is from five to six pounds for each person; but we believe the estimate for the United States is too low. Mr. Bowring, in his Report on the German Zollverein, states the consumption at $4\frac{7}{0}$ pounds to each family (or less than a pound to each person), but this is certainly below the present distributive amount. The estimate for France is from four to four and a half pounds to each person. Dr. Dieterici, of the Statistical Bureau of Berlin, estimated the consumption in Prussia, in 1806, at three-fourths of a yard; in 1841 at seven yards; and in 1844, at thirteen yards; but it is now believed to amount to from twenty-four to thirty yards. In Turkey and the adjacent countries the consumption is estimated at from two to two and a half pounds for each person. With respect to India and China our knowledge is less certain. Mr. Royle, in his excellent work on "The Culture and Commerce of Cotton in India," informs us that some observers estimate the consumption in British India at twenty pounds to each individual, the aggregate consumption at 3,000,000,000 pounds, and the crop at 3,100,000,000. He questions the correctness of this estimate; but the cotton produced there is different in quality, unclean, and badly prepared for the loom, and woven into inferior fabrics which are used for more varied purposes than cotton cloth is applied to in other parts of the world, including not only the cloths and robes of the people, but their beds and bedding, tents, cords, bands, and almost every purpose to which a textile material of such softness and flexibility is possibly adapted.

The importance of this product to the people who there cultivate and consume it is unquestionably great. In fact, we cannot comprehend how what appear to be their absolute wants could be gratified without it. While it supplies their own requirements, however, in their present condition, it makes but little impression upon the general commerce of mankind. In this respect, the product of the United States, where its extended culture does not date a century back, is of the first importance, though the experiments of the English in British India were commenced a century earlier, and though the history of the culture of the plant in Asiatic countries runs through thousands of years. No branch of industry probably ever rose to such magnitude in so brief a time. Producing a very large annual supply above the actual wants of the country, and of a material superior in quality to the yield of any other land, the United States possesses by virtue of this crop an interest in the commerce of the world, which could not be secured by means of a product less peculiar in its nature, or less intimately connected with the social condition of civilized Europe. This cotton chain not only binds one section of our land to the other, but unites England to us

"With links more durable than links of steel."

English and American fabrics made from our cotton are known over the whole globe, and in the markets of China and India take precedence of the products of the indigenous staple, in some fabrics, not only because they are better, but because they can be purchased even there at lower prices. Thus, this improved product of the soil in America, aided by the inventions of Arkwright, Watt, and Whitney, is even now more powerful than armies in securing the advancement of civilization and enlightened liberty. Their

influences are yet to increase as the demand for cotton is augmented. There must be more soil devoted to its culture, or that already under tillage must be improved in fertility. More laborers must bend to the work, or the industry now so applied must be rendered more productive. And none of these changes can be accomplished without visible effects upon the social and political affairs of mankind.

CHAPTER IX.

COTTON SEED—CHEMICAL COMPOSITION—UTILITY OF SURPLUS SEED—FOOD FOR CATTLE—MANURE—OIL—OIL-CAKES.

Prof. Jackson has made several analyses of cotton seed, which, together with his remarks suggested by his examination, we here present for the benefit of the reader.

His first analysis was made for the purpose of determining the proportion of fixed oil contained in the seed; the next was a chemical examination of the properties and composition of the "oil-cake," or what remains of the seed after the extraction of the oil. The third gives the true elementary constitution of the oil-cake; and the fourth, the nature and proportions of the inorganic principles, or mineral salts, contained in the ashes of the incinerated oil-cake, and also, that of the seed before the oil was separated. It will be understood by the chemist that a vast deal of labor has been required to work out all these results.

Separation of the Oil.—In order to separate the fixed oil, pure ether was employed, and it was found that one hundred grains of the dried pulverized seeds yielded, in one experiment, 39.7, and in another 40 per cent. of pure fatty oil. By pressure, 33 per cent. of oil was obtained. The specific gravity of the oil obtained from

the ethereal solution, was 0.933, water being unity. This is also the specific gravity of purified whale-oil.

Cotton-seed oil is stated, by Dr. Wood, to be a drying oil; but that obtained by Dr. Jackson does not appear to possess drying properties, serving perfectly well for the lucubration of machinery, and for burning in lamps, as well as for making soap. It will also serve as a substitute for olive oil in many cases, and perhaps may be eaten as a salad oil, for it has no disagreeable odorous taste.

Chemical Examination of Oil-Cake.—Linseed oil-cake is well known, both in Europe and in this country, as valuable food for cattle, and as an excellent fertilizer, worth from forty to forty-five dollars per ton for the latter purpose. On examination of the cotton-seed oil-cake, it is found to possess a sweet and agreeable flavor, and is much more pure and clean than linseed oil-cake. One hundred grains of the seed leave sixty grains of oil-cake. This cake, examined for sugar, is found to contain 1.1 grains, and for gum, thirty-five grains. Iodine gives no proof of the existence of any starch in cotton seed, nor in the oil-cake. Alcohol dissolves out the sugar, which is, like that obtained from raisins, grape-sugar. Boiling water dissolves the gum, and becomes very mucilaginous. The gum is precipitable from the water, by means of pure alcohol.

Ultimate Analysis—Elementary Constituents of the Oil-Cake.—Carbon, 37.740; oxygen, 39.663; nitrogen, 7.753; hydrogen, 5.869; salts (inorganic), 8.960. Total, 99.985. These salts are obtained by the combustion of a separate portion of the same cake.

Chemical Composition of the Salts.—Three hundred grains of cotton seed burned give 16.5 grains of ashes,

which yield alkaline salts soluble in acids. Of the 16.5 grains of ashes, it is found that 9.13 grains consist of phosphate of lime. On separating the various salts, and reducing them to their ratios, for one hundred grains of the oil-cake the result is found to be as follows:

Alkaline salts, soluble in water	0.13
Phosphate of lime	3.04
Potash	0.46
Soda	0.53
Phosphoric acid, with traces of sulphuric acid and chlorine	0.81
Silica, and oxides of iron and manganese	0.18
	5.15
Loss	0.35
	5.50

The foregoing analyses of cotton seed justify and explain the use made of them by the Southern planters, in preparing the soil with the rotted seeds as a special manure for Indian corn, which draws so largely on the soil for phosphates. It will also be seen that, since the cotton-seed oil-cake contains nearly eight per cent. of nitrogen, and nearly six per cent. of hydrogen, the elements of ammonia are present in sufficient quantities to form about ten per cent. of ammonia, a powerful stimulant to vegetation, and a solvent and carrier of humus into their circulation. The carbon is more than sufficient to take up all the oxygen in the formation of carbonic acid, another active fertilizer; and the excess of carbonaceous matter will remain and form humus, or vegetable mould, which the alkalies, soda, potash, and ammonia will, in part, dissolve and carry into the circulation of plants, which possess the power of approximating and converting it into their tis-

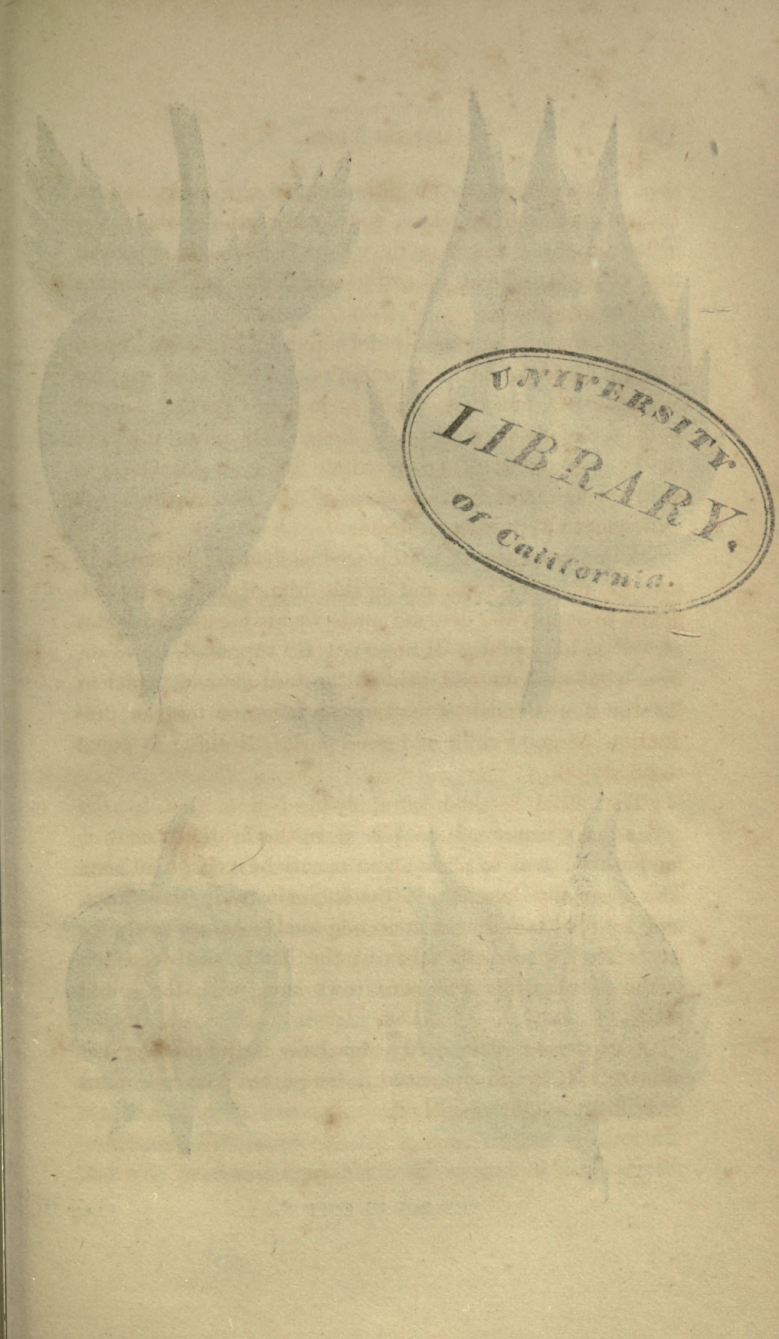
sues. The phosphates go ultimately to the seeds, and, in Indian corn and in wheat, concentrate wholly about the germs in their mucilage or "chits." Thus it is proved that every ingredient of cotton-seed cake acts as a nutriment to vegetation.

Cotton seed are greedily devoured by cattle and hogs, and are found to be quite nutritive. Fresh seed may be fed to cattle, but they ought to undergo partial decomposition before being given to hogs. The fibre adhering to the new seed seems to irritate their air-passages, exciting cough and inflammation of the lungs, which not unfrequently terminate in death.

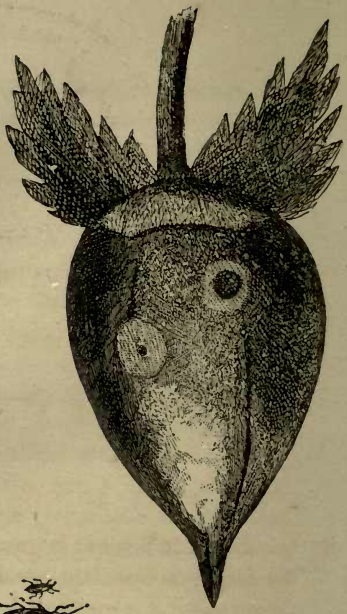
A judicious use of cotton seed as food for animals will save the planter's corn, and enable him, if he is scarce of grain, to supply the demand made by his horses and mules as well as his family. It must not be supposed, however, from what we have said, that cotton seed alone is sufficient for the nourishment of cattle and hogs, or for the production of good milk and good pork. Nothing is equal to good corn.

The usual method of applying cotton seed to the ground as a manure, is to pile it in the fields in heaps of ten bushels, so as to place about twenty bushels on an acre. This is usually done late in the fall or early in the winter, and by planting time the decomposed seed are ready for use. They are usually taken by the hands and deposited in the cotton drills and corn rows along with the sound seed.

Cotton-seed oil is used extensively for lubricating machinery. It is also consumed in lamps, but does not afford as brilliant a light as coal oil.


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THE ROT IN COTTON. PLATE III.

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CHAPTER X.

DISEASES OF THE COTTON PLANT.

SECTION I.

DISEASES RESULTING SOLELY FROM INSECTS.

THE cotton world is greatly indebted to Mr. T. Glover for his researches into the diseases of our valuable plant. We present the result of his labors without offering any apology.

INSECTS FREQUENTING THE COTTON PLANT.

The cotton plant furnishes food for numerous insects, some of which feed exclusively upon the leaf, some upon the flower, while others destroy the young buds and bolls. It is my purpose to describe these insects, not in the order of their classification by natural families, but according to the part of the plant they most generally frequent, or to which their ravages are chiefly confined. Thus, by referring to the parts injured, one can easily recognize the insects, or their larvæ, which attack them in any of the stages of their existence.

Many of these insects at first appear in small numbers, and only become formidable in the second or third gener-

ation; for instance, if a female boll-worm produce five hundred moths, one-half of which are males and the other half females, the next generation, if the increase be in the same ratio, will amount to one hundred and twenty-five thousand caterpillars or moths; and all this is accomplished in the space of a few weeks. It will therefore be perceived that their destruction depends upon prompt and timely action; and planters may materially aid in carrying out a work designed for their mutual benefit, by minutely observing the habits and characteristics of these pests of our fields, devising means for their destruction, and communicating the results of their observations and experiments, through some appropriate channels, to the public.

Insects injurious to the cotton plant consist of those very destructive to the general crops, such as the boll-worm, cotton caterpillar, and some others; and those which do comparatively little injury, their numbers thus far not being sufficiently great to cause much damage, such as the leaf-rolling caterpillar (*Tortrix*) and several insects hereafter mentioned. There are still others, which do not materially injure the crop itself, such as the span-worm, and others which only feed upon the petals or pollen of the flowers. There are also many insects found in the cotton fields which do no damage whatever to the plant, but merely feed upon weeds and grass growing between the rows, such as the caterpillar of the *Argynnis columbina*, which feeds upon the passion-vine, and that of the *Zanthidia niceppe*, which sometimes devours the Maryland cassia, and produces the beautiful orange-colored butterflies, seen in vast numbers hovering over moist or wet places on the plantations.

A class of insects which is highly beneficial, comprehends the larvæ of the lady-bird, the ichneumon flies, and

many others, that are ever on the search for living victims amongst the noxious tribes, and which serve to keep the numbers of the latter within proper bounds.

Thus, it is highly necessary to be able to recognize the injurious from the comparatively innocuous as well as the useful insects, and I have therefore thought proper to describe and figure most of those which infest the cotton fields, as many of them feed upon or injure the plants in one State or another; and, although they may do but little injury at first, yet were they to multiply as fast as some others, they would eventually become as great a nuisance as the boll-worm is at present. According to a communication from Colonel Whitner, of Tallahassee, in Florida, the latter insect was scarcely known in that region before the year 1841; but it has since increased to such an extent as to cause an immense yearly loss to the planters.

Several methods of destroying insects on plantations and elsewhere have been recommended, one of which is the use of fire or burning torches. The innumerable myriads of nocturnal moths, being attracted by the lights, burn their wings as they hover around, and are either destroyed at once or disabled from flying about to deposit their eggs in distant parts of the field. A species of lantern has been used for entrapping such as are attracted by light, and with some success. It is formed of a top, bottom, and back, made of wood, with a glass front and sides, a little more than a foot square, according to the size of the glasses used. The front is supported by a pillar at each corner; on the inside of the back of the lantern is fastened a tin or glass reflector. The three glazed sides consist of two panes, sliding in grooves, made in the top and bottom boards, and meeting in the middle at an angle

of about one hundred and twenty degrees, instead of one pane, as in common lanterns. These panes can be slipped in and out, so as to leave a space open between them, larger or smaller as may be desired. A lamp is placed in the centre of the bottom, protected from insects and wind by a common glass chimney, which protrudes through a hole in the top. All the bottom of the box inside of the glass having been previously cut away, excepting a circular place on which to put the lamp, it is then deposited on a vessel or barrel covered with cloth, having an aperture cut in it corresponding with the bottom of the box, and the vessel beneath, containing molasses, or some other adhesive substance. The insects which may be flying about will be immediately attracted by the light, and approach the angle of the panes until they shall have entered the aperture, when, once within, and not being able to fly out again, they will come in contact with the heated glass chimney, and thus be precipitated into the vessel beneath, in which they will perish.

Another plan, which it is hoped may, upon experiment, be found applicable to the enemies of the cotton plant, has lately been reported as having proved efficient as a means of destroying the tobacco-worm in Florida. This worm is the larva of a large moth commonly known by the name of the "tobacco-fly" (*Sphynx Carolina*), which is in the habit of feeding upon the nectar, or honey, contained in flowers, over which it may often be seen in the evening, poised in the air in a manner similar to that of the humming-bird, making a buzzing noise with its wings, and busily employed in extracting the sweets by means of its long trunk.

As it had been previously observed that these moths are particularly fond of the Jamestown weed (*Datura*

stramonium), a plan adopted in Florida as an effectual means of destroying them, and which it is said has succeeded to a considerable extent, has been communicated by Mr. Jesse Wood, of Mount Pleasant, in that State, who says:

"About five years ago, Mr. Igdaliah Wood, of this vicinity, endeavored to poison the fly that produces the horn-worm, by applying a preparation of cobalt and sweetened water to the flower of the tobacco-plant. He found some difficulty in consequence of the cup of this flower not being in a favorable position to retain the poison. Mr. George Sunday next tried the bloom of the gourd-vine, with better success. Mr. E. Johnson afterward used the Jamestown weed, which answered the expectation of the most sanguine. The preparation consists of about a pint of water, a gill of molasses or honey, and an ounce of cobalt. After inserting a quill through the cork of the bottle, he let fall a few drops of this mixture into the cup of the flower about sunset. As this poison will soon kill the stalk of the Jamestown weed, the best plan is to break off the blossoms, make a hole in the ground, and place them in it. It is thought that the flies find them quicker than when left upon the stalks. It is certain to destroy the moths, although they frequently live until ten o'clock the next day, notwithstanding they are disabled from flying or depositing their eggs soon after taking the poison.

"I consider this discovery of immense value to tobacco planters, and, if it or any similar method should lead to the destruction of the cotton caterpillar and boll-worm, which is highly probable would be the case, it will be of incalculable benefit."

From this statement, it will be seen that, if such a plan is really of utility when applied to the cotton-fly, there can

be no reason why it should not answer also in regions where honey-bees are not kept, for all such insects as are attracted by sweet substances; and it is to be hoped that experiments will be made the ensuing season, and reported for the public good. The thing to be chiefly desired now is, to find out the favorite food of the particular kind of insect to be destroyed; then to discover and use some efficient poison for the accomplishment of the purpose. If, however, birds should perish from feeding upon these poisoned insects, it will somewhat militate against the advantages of the plan.

Several experiments were made in Florida by the writer, on the utility of using arsenic, cobalt, and strychnine, as means of destroying insects, some few of which succeeded, while many failed. In several instances, the insects would not touch the mixture at all.

Honey or sugar and rum, when rubbed on the bark of trees, will attract and intoxicate several species of insects, and might sometimes be advantageously used. Many planters in the Southern States recommend the berries of the "China-tree," or "Pride of China" (*Melia azderach*), to be put around cabbage-plants, in order to prevent the attack of the cut-worm; and as it is already known that these berries have an intoxicating effect upon the robins which eat so freely of them, they may have the same narcotic properties when applied to insects. It is at least worth while to make the experiment. Whale-oil soap, mixed with water, in proper proportions, thrown upon plants infested with plant-lice (*Aphides*), is almost certain to destroy them. Flour of sulphur is stated to be useful when applied to grape-vines, or any other plants which are infested with the red spider, or are attacked by a fungoid growth. A mixture of a gallon of water, a gallon of whis-

key, or other spirit, and four ounces of aloes, was highly recommended in Florida as a certain remedy against the attacks of the orange-scale insects; but, with some who have tried it, although all the insects appeared to be destroyed, in a few weeks they reappeared, showing that the wash would have to be continually repeated until all the eggs under the scales had hatched and the younger broods were killed. Perhaps the same mixture might be successfully used for several other kinds of insects.

But, while so many artificial modes are recommended to accomplish the destruction of insects, planters are very apt to overlook the great daily benefits derived from other agents which have been kindly provided by Nature to check their undue increase. These agents are the birds, which constantly destroy them in any of their varied forms—larva, pupa, or perfect insect. Mocking-birds and bee-martins catch and destroy the boll-worm moth, and many others, even on the wing, when the latter first appear upon the plantations, and thus materially diminish their numbers. If the fields are ploughed in the fall, many insects and chrysalides, which would otherwise come out in safety in the spring, are turned to the top of the furrow-slice, and either fall a prey to the ever-busy birds, or perish from exposure to the wintry frosts.

The nimble and graceful lizards of the South also act beneficially to the planter, as they are constantly on the alert, and catching every insect that chances to alight in their way. Toads, also, do much good, as they wander principally during the morning and evening hours, as well as in cloudy weather, and entrap insects by means of their viscid tongues. Such benefactors as these should be preserved, and not injured or killed as they often are. One pair of wrens or blue-birds, in a Northern garden, or of

mocking-birds on a Southern plantation, will accomplish more in destroying insects injurious to vegetation than can be imagined by one who has not studied their habits, or watched them with attention, when busily engaged in searching under every leaf, or in every fissure of the bark, for their insect prey.

INSECTS FOUND UPON THE STALKS.

The Cut-Worm.

I have not been able this year (1855) to procure specimens of the worms which cut off the young plants early in the season, as I arrived in the region of cotton-fields after their ravages had ceased; but, from the authority of able and scientific planters, I am induced to believe that they are very similar in habits and appearance to many of the cut-worms of the gardens, which penetrate the earth close to a plant, and at night emerge from their retreats to gnaw it off at or near the ground.

A gentleman in Florida, who had been troubled with this pest, informed me that a particular spot of four or five acres in his field had been literally thronging with cut-worms, so that most of the plants were either eaten off or destroyed, and that, finally, fearing the loss of his whole crop, he turned into the enclosure some twenty or thirty young pigs, which soon discovered the worms, rooted them up in great numbers, and fattened on the unaccustomed diet. The cotton was not injured, as the pigs were too young to root deep enough to destroy the plants. The pigs remained where the worms were to be found, never troubling any other portions of the field, and their strong powers of scent enabled them to detect their insect prey even when buried in the earth.

Should the moths of this cut-worm be like those of their congeners of the North, and attracted by light, it might be well to use a lantern like that already described, or to ascertain the favorite substance upon which they feed, and poison them, as suggested in the case of the tobacco-fly.

INSECTS FOUND ON THE LEAF.

The Cotton-Louse.—(*Aphis?*)

When the cotton-plant is very young and tender it is particularly subject to the attacks of the cotton-louse, which, by means of its piercer, penetrates the outer coating, or parenchyma, of the leaf or tender shoots, and sucks the sap from the wound. The under part of the leaves or young shoots are the places mostly selected, and the constant punctures and consequent drainage of sap enfeebles the plant and causes the leaf to curl up, turn yellow, and subsequently fall to the ground. The young lice are extremely minute, and of a greenish color; but when they become older, they are about a tenth of an inch in length, and often dark green; but in some instances they are almost black. It is conjectured that the color somewhat depends upon the health of the plant as well as that of the insect, or perhaps upon their food, as I have seen green and black lice promiscuously feeding upon the same plant. The female produces her young alive throughout the summer, when she may often be seen surrounded by her numerous progeny, sucking the juice from the leaves, and still producing young. Some naturalists state that the females, late in the fall, produce eggs for the generation of the next spring. If so, it is in order to preserve the species, as the

insects themselves are easily killed by frost and cold; and their increase would be incalculable were it not that Nature has provided many enemies among the insect tribes to prevent their too rapid multiplication. Both males and females are said to possess wings at certain seasons; but the females and young in summer appear to be wingless. The end of the abdomen of both sexes is provided with two slender tubes, rising like horns from the back, from which often exudes "the honey-dew," or sweet gummy substance, seen sticking to the upper sides of the leaves beneath them, and which forms the favorite food of myriads of ants. Although young plants are mostly attacked, yet I have seen old "stands" in Georgia, with their young shoots, completely covered with this pest as late as November.

The principal insects that destroy the aphides are the lady-bird, the lace-fly and the syrphus, all of which wage incessant war upon them, and devour all they can find. Another fly, the ichneumon, likewise lays an egg in the body of the louse, which, hatching into a grub, devours the inside of the still living insect until it eventually dies, clinging to the leaf even in death, and the fly makes its appearance from the old skin of the aphis.

When old cotton-plants are suffering from the attacks of the louse, many planters cause their tops to be cut off and burned, and by so doing partially succeed in destroying them; yet, when we consider that, by this method, many young blossoms and "forms" must likewise be destroyed, it must be confessed that the remedy is almost as bad as the disease. In a garden or green-house, a solution of whale-oil soap, from a syringe, showered upon the upper and under parts of the foliage, has been used with much advantage; yet, upon the extended scale of a cotton

COTTON LOUSE.

Magnified. *Magnified.*

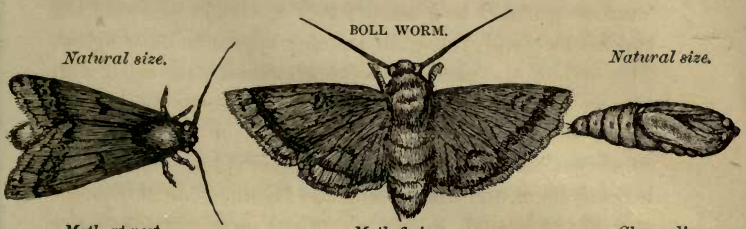


Aphis. *Aphis.*

Natural size *of Cotton Louse.*

BOLL WORM.

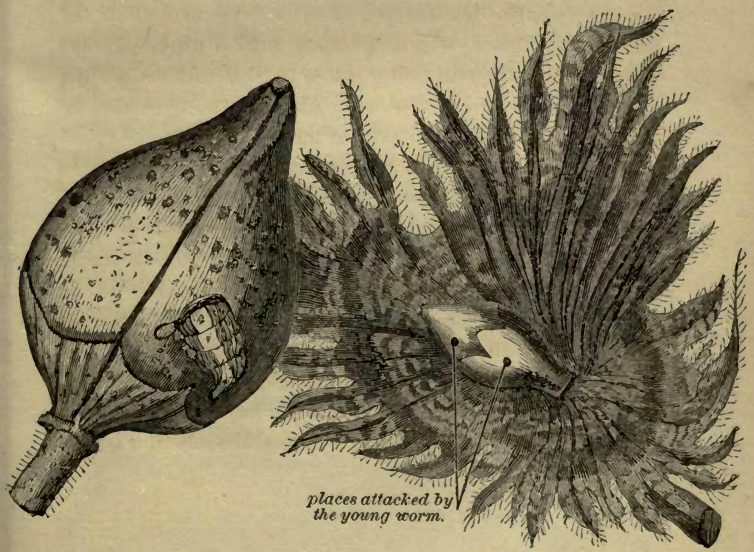
Natural size. *Natural size.*



Moth at rest. *Moth flying.* *Chrysalis.*



Cocoon of earth. *Full grown Caterpillar.* *Effect of insect on young boll.*



places attacked by the young worm.

Old Boll attacked, and old Worm. *Young Boll attacked.*

INSECTS INJURIOUS TO THE COTTON PLANT. PLATE IV.

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plantation, such a remedy is altogether impracticable, and, until we can collect further information upon this subject from intelligent planters, we must rest content with the instinct of our insect allies.

Grasshoppers.—(*Locusta ?*)

Grasshoppers, or, more properly speaking, "locusts," occasionally do much damage to young cotton-plants, as they not only feed upon the tender leaves, but have been caught in the very act of devouring the petals of the flowers in the fields of Georgia, as late as the month of November; but, as at this time the grass on which they usually feed abounds between the rows, the damage done by them to the general crop is but slight.

Several species of grasshoppers, or locusts, infest old cotton and grass fields, some of them being of large size and possessing great powers of flight. It may, however, be observed, that the true locust is not the insect generally known by that name in the United States, which is in reality a harvest-fly (*Cicada*), usually inhabiting trees, where it makes an incessant buzzing noise which may be heard at a great distance during the summer and autumnal evenings. The shape of the harvest-fly is much clumsier and broader than that of the real locust, and the under-wings are not folded up like a fan, under a wing-case, but transparent, stiff, and veined.

The real locust is similar to the grasshopper in shape, but the body is more robust, the antennæ shorter, and its flight much longer and more vigorous. Its under-wings, also, when at rest, are folded up in fan-like plaits under the outer-wing covers. Grasshoppers and locusts are produced from eggs as perfect insects, with legs and antennæ.

They are able to run about and leap with great agility, but are entirely destitute of the rudiments of wings, except in the pupa state. It is only the perfect insects which are able to perpetuate their kind. They are generally furnished with ample wings, which enable them to fly from field to field. Grasshoppers and locusts do much harm, when very numerous, to grass and vegetables, and even to fruit-trees, as well as to cotton. Turkeys, ducks, and other fowls feed upon them with great avidity, and are very useful in diminishing their numbers. In some of the Northern States, they have been destroyed by means of sheets spread upon poles, so as to sweep them into a bag fastened behind, which is drawn over the fields infested by them; they are then killed by means of boiling water or fire.

The Leaf-Hopper.—(*Tettigonia?*)

The leaves of the cotton-plant are often injured by the leaf-hopper. This small insect is found upon the plant in the larva, pupa, and perfect state. In all these forms, it sucks the sap from the leaf, causing small diseased and whitish-looking spots, much disfiguring the foliage, and injuring the plant itself, when the insects are very numerous. They are also found in great numbers on grape-vines, in Florida, and injure the foliage to a considerable degree.

The perfect insects are very small, measuring only from one-tenth to three-twentieths of an inch in length. The head is somewhat crescent-shaped, of a green color, with two red spots on the upper surface. The thorax is also green, with two crescent-shaped spots of red on each side of a small red spot in the centre. The wing-cases are green, with two stripes or bands of red, running parallel

down each wing-case, from the thorax to the upper margin, where they form an acute angle. The legs are yellowish-green, the hinder pair being much longer than the others, and furnished with bristles on the tibia. In the larva state, they are able to leap with great agility; but it is only in the perfect state that they are able to fly, the under-wings being hidden by the wing-cases, and not perfectly developed in the larvæ or pupæ. There are several species of these insects found upon cotton, which it will not be necessary here to describe, as their natural history and habits are nearly the same.

In using the lantern already described, it was found that thousands of these small insects were attracted from some grape-vines in an adjoining field. The use of fires or lights may therefore be recommended to destroy them, when they become very numerous, although, as regards the cotton, they are not often found on it in numbers sufficient to do much harm.

The Cotton Caterpillar.—(*Noctua zylina.*)

The leaves of the plant are sometimes entirely devoured by what is commonly known to planters as the "cotton caterpillar," or "cotton army-worm." It does not appear every year in immense numbers, but at uncertain intervals. This season (1855), it first made its appearance in the vicinity of Tallahassee about the month of August, on the plantation of Mr. Hunter, and then spread gradually through the rest of the plantations in that region. In October, it had already committed considerable ravages in several of the cotton-fields, not so severe, however, as had been anticipated, though the crops on several plantations were somewhat injured.

The perfect insect, or fly, when at rest, is of a triangular shape, the head forming one and the extremities of the wings the other two angles. The color of the upper-wings is reddish-gray, a dark spot with a whitish centre appearing in the middle of each. The under-wings are of a dark reddish-gray. The moth of this caterpillar loses much of its grayish cast when it becomes older, and the down has been rubbed from the wings. It then assumes more of a reddish tinge.

The perfect flies, or moths, are easily attracted by lights, and may be found resting in the daytime on the walls or ceilings of rooms, attracted there, no doubt, by the candles or lamps on the evening before. If undisturbed, they will remain motionless during the day; but, as night approaches, they fly off with much vigor and strength. When in the open air, they may be found among and under the leaves of the cotton-plant, as well as those of the weeds which surround the plantation. The eggs are deposited principally on the under sides of the leaves, but often upon the outer calyx; and I have even found them, when very numerous, upon the stem itself.

Wherever these caterpillars were very abundant, I counted from ten to fifteen eggs on a single leaf, which are very small, and difficult to be distinguished from the leaves themselves, on account of their green color. In shape, the eggs are round and flat, and, when examined under a microscope, they appear regularly furrowed or ribbed. Their color, when freshly deposited, is of a beautiful semi-transparent sea-green. They are closely attached to the leaf on which they are laid. I am thus particular to state this, because, in an able article published some time ago, it was alleged that "the egg is fixed upon the leaf by a small filament attached by a glutinous substance." This

mistake might the more easily be made by any person who had not himself observed the eggs when hatching, as that of the lace-wing fly is held by such a filament, and, moreover, is found in similar situations on the leaves, but generally with or near a colony of plant lice, where the instinct of the parent lace-wing fly teaches it to deposit its eggs, and thus provide for a supply of fresh food for the young larvæ, which feed upon and destroy millions of the cotton-lice. There is a great difference also between the eggs of the caterpillar moth and those of the boll-worm moth, the first being, as before stated, round and flattened in shape, and green in color, whereas those of the boll-worm moth are not flat, but more of an ovoid shape, and of a dirty-yellowish tinge. I cannot state exactly what time is required to hatch the eggs after they have been laid by the parent fly, as I could not succeed in procuring any from the moths hatched and kept in confinement, although carefully preserved for the purpose. Dr. Capers says that it requires from fourteen to twenty days; but the eggs I found in the fields invariably hatched within a week from the time they were brought into the house. However, this must depend a great deal upon the state of the atmosphere and the warmth of the season. The young caterpillars, when hatched, very soon commence feeding upon the parenchyma, or soft, fleshy part of the leaves, and continue to do so until they become sufficiently large and strong enough to eat the leaf itself. They are able to suspend themselves by a silken thread when shaken from the plant. They change their skins several times before attaining their full growth, when they measure from one and a half to nearly two inches in length. The first brood of caterpillars, in August and September, were all of a green color, with narrow, longitudinal, light stripes along each

side of their bodies, and two broader light-yellowish stripes along each side of their backs, down the centre of each of which was one distinct, narrow, light-colored line. Each of the broader bands was marked with two black spots on each segment; and on each segment of the sides were three or more dark dots. The head was yellowish-green, spotted with black. The caterpillars of the second and third generations are of a much darker color than those of the first; their under parts are more of a yellowish-green, and their sides sometimes of a purple cast; their backs are black, with three distinct light-colored lines running down their length; and their heads are also darker, and of a yellowish-brown, spotted with black.

The question naturally arises, What causes this change of color in the latter part of the season, since the moths hatched from the lightest and darkest caterpillars prove to be exactly the same? Several planters attribute it to the influence of the sun, or to the food upon which they subsist; but this can scarcely be the case, as I have often observed individual caterpillars, evidently of the second or third generation, of the lightest green color, amongst a crowd of the black worms on the same leaf, as late as October, and exposed to the same influences of the sun.

These insects appear to multiply to the greatest extent in damp, cloudy weather. When the older caterpillars are suddenly touched, they have the habit of doubling themselves up and springing to a distance of several times their length; but when undisturbed, and not feeding, they appear to rest on the leaf with the fore part of the body elevated and somewhat curved, whereas, sometimes they keep up a species of swinging or jerking motion from side to side, as if enjoying the heat of the sun.

This caterpillar is furnished with six pectoral, eight ventral, and two anal feet, of which, however, the two anterior ventral ones are imperfect, small, and apparently useless, so that its mode of progression somewhat resembles that of the span-worm, or looper, of the North, elsewhere described.

In fifteen or twenty days after the caterpillar has attained its full size it ceases to feed. It then doubles down the edge of a leaf, and fastens it with its own silk to the main part of the same leaf, or by webbing several leaves together, forming thereby a very loosely-spun cocoon. In this, it transforms into a chrysalis, which at first is green, but in a short time after changes to a chestnut-brown, or even to almost black.

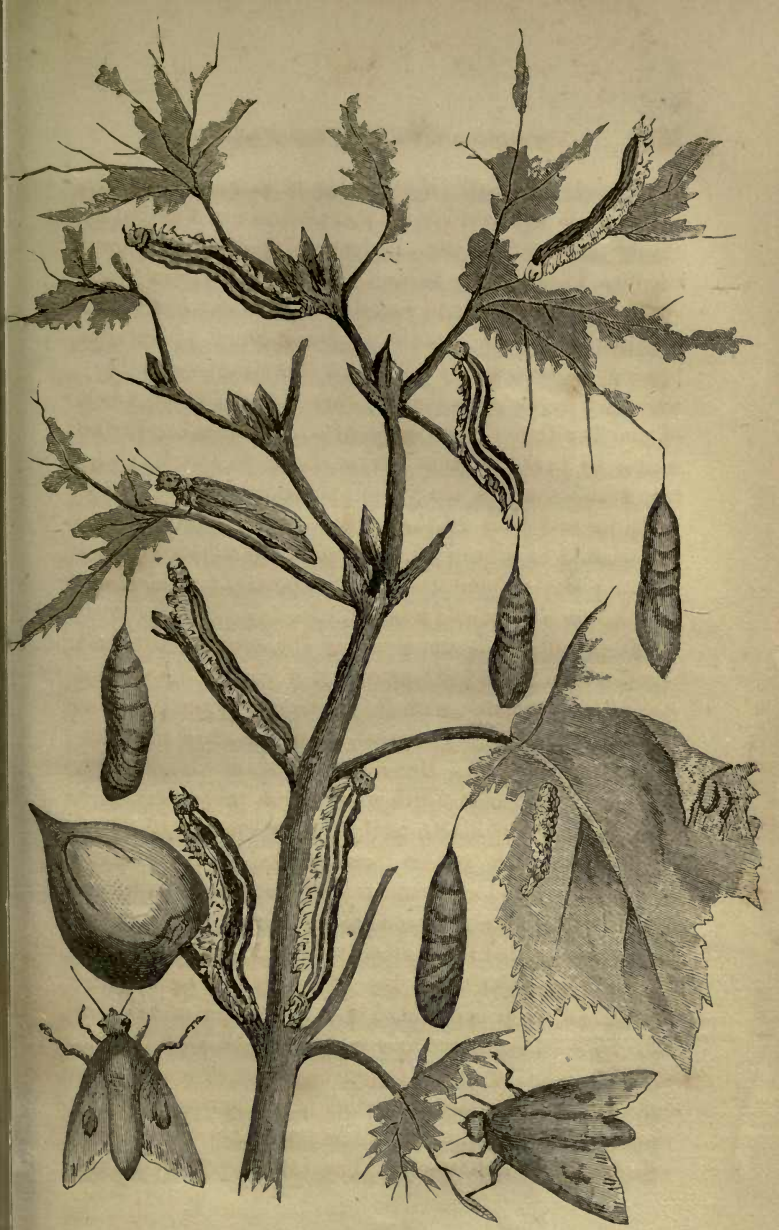
The first brood I raised were fifteen days in the chrysalis state before making their appearance as perfect moths; but, as this happened in a cold room and screened from the sun, I am of the opinion that, when they are exposed to a warm sun in the open fields, the time must necessarily be much shorter. I raised one caterpillar late in the fall, which was even thirty days before emerging from its cocoon; but this I attributed entirely to the cold weather and non-exposure to the sun. This fact would tend to show that the hatching of the chrysalis may be delayed, by peculiar circumstances, until long after the natural time.

The tail of the chrysalis is furnished with several small hooks, bent inward, by means of which it is enabled to hold fast to the loose web of which the cocoon is formed, while emerging from the chrysalis skin, or, in case of accident, to prevent it from falling out of the cocoon during the prevalence of strong winds.

There have been many speculations regarding the

origin and periodical visits of this moth. In 1843 Mr. Whitemarsh B. Seabrook read a "Memoir on the Cotton-Plant" before the State Agricultural Society in South Carolina, in which he says, "That the cotton moth survives the winter is nearly certain; an examination of the neighboring woods, especially after a mild winter, has been often successfully made for that purpose. They were seen by the writer in May last, in the edge of a belt of pines, within a few yards of a cotton-field. In the winter of 1825, Benjamin Reynolds, of St. John's, Colleton, found them in the woods, principally on the cedar-bush, incased alive in their cover, impervious to water, and secured to a twig by a thread. The pupæ, wrapped in cotton leaves, from their bleak exposure, invariably die on the approach of cold weather."

From what was stated to me by some of the best planters in Florida last summer, it would seem that this caterpillar appears on their plantations more or less, almost, if not every year, and sometimes in a most unaccountable manner. Mr. E. Richards, of Cedar Keys, furnishes a statement which would seem to prove that it is migratory in its habits, as there is no other method of accounting for its sudden presence, except that, having previously existed on some other plant or weed, it had left it for food more congenial to its taste, although it has been asserted that the real caterpillar will eat nothing but cotton. He says: "The last of July, 1845, these caterpillars made their appearance in a small field of three or four acres of sea island cotton, planted on Way Key, as an experiment to see if cotton could be advantageously cultivated on the Keys, no other cotton having been previously planted within eighty miles of them; but the whole crop was devoured. The caterpillar was at the



COTTON CATERPILLAR. PLATE V.

same time destroying the cotton in the interior of the country."

In a statement made this season by Mr. William Munroe, of Gadsden county, Florida, to the Agricultural Department of the Patent Office, he appears to think sea island cotton not so liable to be attacked as the short staple, when the two varieties are planted together. In his letter he says: "I observed, when I had two fields of cotton adjoining, the one short staple and the other sea island, and the cotton caterpillars made their appearance, that they always destroyed the short-staple cotton first. Four years ago my crop was destroyed by the worm, and at that time they ate every green leaf on the short-staple cotton before they attacked the sea island. This year (1855) my short-staple crop was destroyed by the worm, on the Appalachicola river, and I observed that after the short-staple crop was all eaten, several sea island stalks in the field, at a little distance, seemed to be uninjured; but, upon close examination, it was found that the worm had just commenced upon them. My impression, from the above observation is, that if we in this country were to confine ourselves to the production of the sea island cotton, the attack of the caterpillar would be much less frequent, or would probably altogether cease."

In regard to the periodical visitations of these caterpillars, Dr. Capers remarks that their first appearance, as destroyers of cotton, was in the year 1800, and that in 1804 the crops were almost destroyed by them. A snow-storm occurred, however, and swept them away; but they were found the succeeding seasons, though in smaller numbers. In 1825 they were spreading, but perished again by a storm. In 1826 they destroyed the crops. The first notice of them in this year was on the first of August, at

St. Helena. Soon after they were found on all the sea-coast, from New Orleans to North Carolina. On the 23d of the same month they had destroyed almost all the cotton leaves, but suddenly left the plant, though not for the purpose of webbing, as many of them were young. The cause of their sudden disappearance is stated to have been that they were too much exposed to the powerful effects of the sun, in consequence of the plants being nearly destitute of foliage, and not protecting them from its direct rays.

Colonel Benjamin F. Whitner, of Tallahassee, has also written an interesting article on the depredations of this caterpillar in that vicinity. "In 1835," says he, "the crops were entirely exempt from the ravages of the caterpillar. In 1836 it appeared by the first of October, but did no harm. In 1837 no mention is made of it. These notes were made in Madison county, Florida."

Colonel Whitner then moved to Leon county, in the same State, where, in 1838, the caterpillar appeared early in August. The second brood stripped the plants by the 20th of September, and were so numerous that, after devouring the entire foliage, they barked the limbs and stalks, and ate out bolls nearly grown. In 1839 they were less numerous, and appeared late. In 1840 they came out from the 15th to the 20th of July, and, by the 6th of September, the plants were stripped of their leaves and young bolls, so that the entire crop was less than half of the average of other years. In 1841 this caterpillar was seen in Madison county from the 15th to the 20th of August, and in Leon county between the 20th of August and the 1st of September. The loss was serious, comprising probably one-fifth of the crop. In 1842 no damage was done. In 1843 they appeared near Tallahassee

on the 1st of August, and plantations were stripped by the 15th of September. The crop was cut off from one-third to two-fifths by the caterpillar and storm. In 1844 the cotton-worm was found webbed up on the 13th of July, and by the 15th of September some plantations were entirely denuded; yet, in other parts of the county, the ravages were only partial. In 1845 there was no appearance of the caterpillar. In 1846 it was found webbed up by the 7th of July. The second brood began to web up on the 26th of that month; and by the 20th, the parts of the field in which the worm was first seen were found to be eaten out, and the fly, the worms, large and small, and the chrysalides, were discovered at the same time, a state of things never observed before. By the 5th of September the damage amounted to a loss of more than one-half of the crop. In 1847, although the fly was seen on the 16th of July, no injury was done to the crop. In 1848 it was but slightly injured; but the year 1849 was particularly marked by the ravages of the caterpillar, as well as that of 1852.

Colonel Whitner further observes that these worms appear in successive broods, and accomplish the cycle of their transformations in from twenty-six to thirty days, which has also been corroborated by others.

A caterpillar hatched from the egg, under my own inspection, however, passed twenty days before webbing up; but as it had been kept in confinement in a cold room, most probably the growth was not so rapid as it would have been in the open air and exposed to the warmth of the sun. The skin was shed five times during the period of its growth, and on the twentieth day the caterpillar began its web.

In a very interesting communication from Mr. E. N.

Fuller, of Edisto island, South Carolina, he describes the depredations of the caterpillar in his neighborhood as follows:

"In 1840, I discovered their ravages, confined to the luxuriant portions of the fields near the sea-coast of this island. The larvæ were destroyed in the latter part of September. In 1843 they were first heard of by the 1st of September, when their ravages, limited as in 1840, were quite perceptible at some distance. A frost on the 18th of that month probably destroyed them. In 1846 they appeared on the 20th of July; and by the 10th of September, I suppose there was scarcely a cotton leaf or any tender portion of the plants remaining, and the worms, not fully grown, deserted the ravaged fields by millions in search of food, failing to find which they died from starvation. The crop of this island was about forty per cent. of an average one. In 1849 the caterpillars made their first appearance on the 22d of August; their ravages this year being confined to the low spots, caused no injury of moment. In 1852 they were found on the 10th of August about forty miles to the southward, and on this island about the 20th of the same month. They disappeared here, however, without doing injury.

"Thus they have appeared at regular intervals of three years. In 1855, when they were again looked for, an intense drought from the early part of July was sufficient to prevent their increase, had they made their appearance. The old planters say that in 1804 and in 1825 they appeared as in 1846; that is, in periods of twenty-one years.

"As near as I can judge, not having made any record, the length of time from the hatching of the egg to the chrysalis is twelve days; remaining four days in the chrysalis state, and six days more to the hatching of the egg.

This seems to be the case in a season of moisture and heat, without which their progress probably would be more slow."

Among the many remedies recommended for this fly, or moth, fires and lights in the fields have been highly spoken of as attracting and destroying the miller. But even this may have its disadvantages, as Colonel Whitner, who has tried it, states that "it not only attracts the flies from other plantations, but that multitudes of moths perished in the flames." An article likewise appeared in some of the Southern papers, not long since, recommending white cotton flags about a yard square, to be placed in the field, by which the moths are attracted, and upon which they deposit their eggs. Plates similar to those recommended for the boll-worm have also been used with partial success. But to destroy this pest, it will be necessary to ascertain exactly the date of the appearance of the first moths, and then to exterminate them in the best manner, and as quickly as possible. Could not some favorite aliment be found on which the moth prefers to feed, as in the case of the tobacco-fly, and then poison them with some effective agent? This would at once rid the fields of the first broods of moths, the progeny of which, in the second and third generations, might devastate half the fertile plantations of the South.

The Grass Caterpillar.

Another insect, which is often found in cotton fields, and mistaken for the real cotton caterpillar, is commonly known by the trivial name of the "grass-worm" or "caterpillar," owing to the circumstance of its most natural food consisting of grass and weeds, although, when pressed by hunger, it will sometimes eat the leaf of the cotton plant.

These caterpillars were very numerous in the vicinity of Columbus, in Georgia, about the end of September and the beginning of October, 1854. They devoured grass, young grain, and almost every green thing which came in their path. Instances have been known in which, urged as they were by necessity and starvation, they actually devoured stacks of fodder that were stored away for winter consumption. Deep ditches cut in the earth to stop them were immediately filled up by the multitudes which fell in and perished, while eager millions still rushed over the trembling and half-living bridge, formed by the bodies of their late companions, bent on their mission of destruction and devastation.

These caterpillars do no essential injury to the cotton, especially when weeds abound, as they content themselves with the grass growing between the rows; and, unless very numerous, they cannot be classed among those doing much harm to the general crop, and are mentioned here principally as having been so frequently mistaken for the real cotton caterpillar. When pressed by necessity, however, as has already been stated, they will feed upon cotton leaves. I raised about thirty of them upon this food alone, merely as an experiment, and they grew and perfected their transformations, although appearing to prefer a grass diet if it could be obtained. When about to change, they formed cocoons of silk under stones or in the ground near the surface, interwoven with particles of earth, and came out perfect moths from the 24th to the 30th of October; and, as these specimens were kept in a room without artificial heat, I conjectured that those in the open fields would appear about the same time.

At a plantation in the vicinity of Columbus, where the caterpillars were very numerous, and had already devoured

all the grass on one side of a field, which was divided into two equal parts by a broad and sandy carriage-road passing through the centre of it, the grass on the other side having been untouched, it was interesting to observe the operations of numerous colonies of ants that had formed their holes or nests in the road, and were lying in wait for any unfortunate grass-worm, the natural desire of which for a fresh supply of food should tempt it to cross this dangerous path. First, one ant more vigilant than the rest would rush to the attack; then another, and another, until the poor caterpillar, entirely covered by its pigmy foes, and completely exhausted in strength by its unavailing efforts to escape, was finally obliged to succumb to superior numbers and die as quietly as possible, when the carcass was immediately carried off by the captors to their nests, or, when too heavy to be dragged away at once, they fed upon it as it lay in the road. This warfare was carried on every day as long as the grass-worms prevailed, and no doubt their numbers were diminished in this way to a considerable extent.

The grass-caterpillars, when in confinement, very often kill and devour each other; and, when one is maimed in the least, it stands a very poor chance for its life. Several intelligent planters state that, when the grass and weeds are entirely devoured, and no other vegetable food is to be found, they will attack each other and feed upon the still living and writhing bodies of their former companions. One grass-caterpillar which was kept in confinement, although furnished with an abundance of green food, actually appeared to prefer to feed upon other caterpillars, no matter of what kind, so long as their bodies were not defended by long, bristling hairs, or spines.

The grass-caterpillar is from an inch and a half to an

inch and three-quarters in length. A longitudinal light-brownish line runs down the centre, and two yellow lines along each side of the back, which is somewhat veined with black lines, and is of a dark color, marked with black spots, from each of which grows a short bristle, or hair. Below these yellow stripes, the sides are of a dark color, almost black; beneath this, extends a light-colored line, in which the spiracles are placed; the lower part of the body is of a dirty green, spotted with black; the head is black, marked with two lines of a yellowish color, forming an angle on the top; the body is somewhat hairy. This caterpillar has six pectoral, eight ventral, and two anal feet.

The above description applies only to the brightest-colored specimens of the grass-worm, as they vary much in color and markings, some of them being almost black, and showing indiscriminately their stripes. The chrysalis is brownish black, and is formed in a cocoon of silk under the ground, the sand and small pebbles being so interwoven with it as to cause the whole cocoon to appear like an ovoid ball of earth; but it is never found webbed up in the leaves, as is the case with the true cotton-caterpillar, already described. The moth measures about an inch and one-fifth across the wings, when they are expanded; the upper wings are gray, slightly clouded with a darker color, and a lighter spot or ring is faintly seen in the centre; the under-wings are of a yellowish white, shaded with gray along the margin, near the upper-wings.

Specimens of these caterpillars were brought to me when at Savannah, in Georgia, and they were suspected to have injured the rice in that vicinity in the month of June. Colonel Whitner, of Tallahassee, speaks of the grass-caterpillar as having stripped fields of grass, in 1845, and also as attacking the corn, sugar-cane, and upland rice. It has

likewise been said that an insect similar, if not identical with the grass-caterpillar, destroys the leaves of the sweet potato. Thus it appears to be almost omnivorous, and not choice in its selection of food, like the true cotton caterpillar, which is believed to confine itself to the cotton plant alone.

The grass-worm cannot be classed among those insects very injurious to cotton, although instances have been known where it has destroyed the foliage to some extent. It is more especially mentioned here as being found in cotton fields, and often confounded with the true cotton caterpillar. The difference, however, is more plainly described under the head of the latter.

The same remedies are applicable to this insect as have been suggested for the boll-worm caterpillar, or any other night-flying moth.

The Red Spider.—(*Acarus?*)

Much injury is done to the cotton leaf by a minute red spider, which presents very much the appearance of incipient rust, except that the leaf is of a more rusty brown in spots, instead of the bright yellow of the real rust. This red spider principally attacks the under side of the leaf, the spots caused by its punctures turning brown, and finally increasing until it is completely stung all over, and falls from the plant.

This insect is extremely minute, and when on the leaf it can scarcely be discerned by the naked eye. Some of the young appear to be of a greenish cast; but when they are advanced in age the abdomen assumes a dark crimson shade, with darker maroon spots upon its upper surface. The legs, which are hairy, are eight in number.

This family of the mites (*Acari*) do much injury to

vegetable life, as they are so extremely minute as to escape the notice of the superficial observer. When they infest grape-houses, or rose-bushes, it has been recommended to dust the leaves while moist with flowers of sulphur.

The Drop or Hang Worm.—(*Œceticus?*)

The "drop-worm," as it is commonly called, is occasionally found upon the cotton leaf, but generally infests the arbor-vitæ, larch, and hemlock-spruce. It is also found upon many of the deciduous-leaved trees, such as the linden, negundo, and maple. Dr. Harris states that the female worm never quits her case, but lays her eggs in the skin of the chrysalis, in which she herself also remains until the eggs are all deposited, when she closes the end with down, and crawls out of the case and dies. These eggs being hatched, the young worms, after they are hatched, make little silken cocoons, open at both ends, and are covered with fragments of leaves, twigs, etc., in which they conceal themselves, and drag them about wherever they move. These cases are enlarged as the insects increase in size, and are still carried about by the worms. When they change their places, they protrude their heads, the first three segments of the body, and six legs, from one end of the case; but when the insects wish to rest, each case is fastened by a few threads to the leaf or branch, and they retreat within. When shaken from the tree by an accident or by high winds, the worms are able to suspend themselves by means of small threads, and hang in the air; hence the name. When young, they are often blown from tree to tree, and thus carried to a considerable distance from the place where they were hatched.

The males and their cases are much smaller than those

of the females, the worm being only about an inch in length. The first three segments of the body are whitish, marked with black lines and spots; the segments where they join are brownish; the head is marked with wavy lines of black on a white ground; the rest of the body is of a dirty, blackish green. It has six pectoral feet, by means of which it moves from leaf to leaf, with its body and case, the latter either perpendicularly suspended in the air or dragged by the worm from behind. There are eight very small ventral and two anal feet, by means of which it clings to the inside of the case. The chrysalis measures about three-quarters of an inch in length, and contains the rudiments of wings, legs, head, and antennæ, like other moths, and is of a dark brown. The perfect moth comes out in autumn, and measures across the expanded wings about an inch and three-twentieths. Its body is downy, and of a blackish brown; the wings are semi-transparent, and scantily clothed with blackish scales, which are blackest on the margins and veins; the antennæ are covered at their tips, and are doubly feathered from the base to beyond the middle. The female is much larger than the male, and never leaves her case, but changes into the perfect insect in the shell of the chrysalis, and only emerges from it when the eggs are laid within. The young, after leaving their maternal case, in the spring, immediately commence their cases, and spread over the native tree or any others that may happen to stand near.

These insects are a great nuisance wherever they once get established, as they are exceedingly prolific. One female chrysalis case, which was dissected, contained seven hundred and ninety eggs, while others have been found to contain nearly a thousand.

These pests are very rarely seen on the cotton plant,

and even when such is the case, they may have been blown there from the cedars, maples, or other deciduous-leaved trees in the woods on the edges of the plantations. They are the more particularly mentioned here, from the fact that, if taken in time, they may easily be exterminated on deciduous-leaved shade-trees; for, as I have before stated, the female cases contain all the eggs, which may be seen in winter hanging on the branches when the leaves have fallen, and even are large enough to be distinguished when on evergreens. It would therefore require but little trouble to pull them off in the autumn and winter, and burn them, so that neither males nor females should escape. If this course were pursued two or three years in succession, there would not be so many complaints in our cities about the drop-worms destroying the foliage of the trees.

The Corn Emperor-Moth.—(*Saturnia io.*)

The foliage of the cotton plant is also eaten by the caterpillar of a large moth. This spiny and stinging caterpillar is often found upon the leaf of cotton in September; it feeds likewise upon the blades of Indian corn, and the leaves of the willow, balsam-poplar, dogwood, and many other trees. Whenever one of them is found in a field, the plants attacked by it may be easily distinguished by their leafless appearance in the midst of the otherwise green and flourishing vegetation, as it rarely quits a plant before it is completely denuded. Often, however, those which have lost their leaves from the rust present much the same blighted appearance; but, in this case, the numerous yellow, withered leaves, which are scattered on the ground, at once indicate the disease.

The thorny spines with which these caterpillars are

armed have a peculiarly poisonous property, and are capable of inflicting painful and severe wounds, similar to the sting of a wasp. It is therefore necessary, if the insects require to be touched, to use a stick or branch, when removing them from the plants on which they feed.

These caterpillars cannot be classed among those very injurious to cotton, as they do not appear to be sufficiently numerous to effect much damage. Very few complaints have been made about them by the planters either of Georgia or South Carolina; but this year (1855) the same caterpillar was found very abundant in the cotton fields near Tallahassee, but the damage done by them was trifling.

Mr. Newman, of Philadelphia, who has paid much attention to the breeding of caterpillars, states that this insect is found on the willow. Dr. Harris says, they are also found upon the balsam-poplar and elm, in Massachusetts; and, according to Smith and Abbot, in their "Insects of Georgia," it is found on the dogwood, sassafras, and Indian corn, which are devoured by them.

This caterpillar is from two inches and a quarter to two inches and three-quarters in length; but, as Dr. Harris has minutely described them, I will quote his own words:

"The caterpillars are of a pea-green color, with a broad, brown stripe, edged below with white, on each side of the body, beginning on the fourth segment and ending at the tail. They are covered with spreading clusters of green prickles, tipped with black, and of a uniform length. Each of these clusters consists of about thirty prickles, branching from a common centre, and there are six clusters on each of the rings, except the last two, on which there are only five, and on the first four rings, on each of which there is an additional cluster low down on each side. The feet are

brown, and there is a triangular brown spot on the underside of each ring, beginning at the fourth." The brown stripe mentioned by Dr. Harris is often of a reddish brown, and, in high-colored and healthy individuals, I have seen it almost of a carmine red.

The caterpillars are gregarious when young; but, when older, they are solitary. When fully grown, they form a brownish cocoon of a gummy substance among the leaves, resembling parchment. The perfect moth comes out the following spring. It is said that there are two broods of these insects in a season, in the Southern States; but I have not observed the caterpillars on cotton later than September.

The chrysalis is brown, and of a short, thick form, with a number of hooked bristles on the tail.

The following is Dr. Harris's description of the moths: "They sit with their wings closed and covering the body like a low roof, the front edge of the under-wings extending a little beyond that of the upper-wings and curving upward. The sexes differ both in color and size; the male, which is the smallest, is of a deep or Indian-yellow color; on its fore-wings there are two oblique, wavy lines toward the hind margin, a zigzag line near the base, and several spots so arranged on the middle as to form the letters A H, all of a purplish-red color. The hind-wings are broadly bordered with purplish red, next to the body, and near the hinder margin there is a narrow curved band of the same color. Within this band, there is a curved, black line, and on the middle of the wing a large, round, blue spot, having a broad black border and a central white dash. The fore-wings of the female are of a purplish brown, mingled with gray; the zigzag and wavy lines across them are also gray, and the lettered space in the

middle is replaced by a brown spot surrounded by an irregular gray line. The hind-wings resemble those of the male in color and markings; the thorax and legs are purplish brown, and the abdomen is ochrey yellow, with a narrow, purplish-red band on the edge of each wing. These moths expand from two inches and three-quarters to three inches and a half."

The only method that can be taken to destroy these insects would be to kill the moths when and wherever found, and to strike the caterpillars from the plants and then crush them under foot. Although they cannot properly be classed among the insects very injurious to cotton, not being sufficiently numerous to do much harm, yet, if left undisturbed, they may so increase as to become a nuisance to the planter both of cotton and corn.

The Cotton Tortrix.—(*Tortrix?*)

When the margins of the leaf of the cotton plant are found rolled up and fastened to the main part by means of a loose web of silk, it is often discovered to be the work of the small tortrix, which makes this shady retreat in order to shelter itself from the sun and rain, as likewise for a place of concealment from birds and other enemies. Sometimes, however, these leaves are similarly rolled up by a spider, as a suitable nest or receptacle for its eggs; but, when this is the case, the inside will be found to contain a silken bag in which the eggs either have been or are about to be deposited.

When disturbed, this caterpillar always retires into its place of shelter, and, if forcibly driven out, it is able to retreat backward from the open end, and to suspend itself in the air by a thread, which issues from its mouth, having

previously fastened the other end of this thread to the leaf from which it had fallen. The leaves attacked by this moth can be distinguished from those that are perfect, by their rolled-up and distorted appearance; and either this insect, or one very similar in habits and appearance, sometimes attacks the young and tender ends of the cotton-shoots, which are often seen webbed up into a mass and partially eaten out.

The caterpillar, when full grown, is about an inch in length, of a bright-green color, with a brownish or black head, and has a helmet-shaped black mark on the first segment of the body. It has six pectoral, eight ventral, and two anal feet; the two anterior pair of pectoral ones being dark-colored.

The chrysalis measures from three-fifths to seven-tenths of an inch in length, is of a brown color, somewhat spiny, and furnished with four hooks at the end of the tail, by which it is enabled to hold fast to its web. The chrysalides are formed in semi-transparent cocoons of loose silk among the leaves; and in about fourteen days, the perfect moths come out. The moth at rest has a somewhat bell-shaped appearance, the upper-wings suddenly becoming quite broad a short distance from the thorax. They are of a chestnut-brown color, with an oblique dark-brown band forming an obtuse angle near the middle; and, on the inner margin of each wing, a rather more indistinct band runs near the body. The tips are also banded with dark brown. The under-wings are yellow, with a blackish-colored mark on their margins and sides, while the under-side is yellow and more or less shaded.

I should judge, from the small numbers of these caterpillars, that they do comparatively little if any injury to the main crop, and no doubt the moths would be attracted

by lights or fires placed in the field at night, as recommended for the moth of the cotton caterpillar. The same plan would also serve to diminish their numbers, should they ever increase.

The Yellow Caterpillar.

There is a yellow, hairy caterpillar found on the cotton plant in September and October, which devours the leaf. The specimens observed in South Carolina and Georgia appeared to be of solitary habits, not congregating together, like the cotton caterpillar and grass-worm, but feeding alone on the plant.

The young of these insects are of a much lighter color than those nearer maturity. The ground color of the old caterpillar is yellow, profusely specked and shaded with small black dots; a yellow longitudinal line runs along the side below the spiracles; on each segment of the body rise numerous small yellowish-brown excrescences, or warts, from which issue tufts of long brownish-black hairs. The head is black, with a yellow stripe running down the middle. It has six pectoral, eight ventral, and two anal feet. The cocoons are ovoid in shape, formed on or near the surface of the ground, and constructed of silk intermingled with gravel, particles of soil, and the hairs from their own bodies. These caterpillars are reputed to be capable of stinging; but as I repeatedly handled them with impunity, their poison, if any, cannot be very powerful.

The chrysalides, which are dark brown, approaching to black, appeared about the end of September, and were quite short and thick. I cannot describe the perfect moth, as, unfortunately, the chrysalides did not live to perfect their last transformation. These caterpillars, although described as infesting cotton, cannot be classed amongst

those very injurious, as they do not appear in numbers sufficient to injure the general crop.

There is a red, hairy caterpillar of like characteristics, that sometimes eats the cotton leaf, but which it is unnecessary to describe here.

The Cotton Arctia.—(*Arctia ?*)

A species of arctia was also found in Tallahassee, in the month of July, upon the cotton plant; but, most probably, the parent moth had wandered away from its more natural food, as the identical kind of caterpillar was found at the same time upon the brambles by the roadside near that place. The plant attacked, however, was in the middle of the field, and not near any brambles or weeds, on which the eggs might have been laid. The bare stem and branches of the cotton were covered with the unsightly web, and all but a few straggling caterpillars had disappeared, having probably webbed up preparatory to the final change.

The full-grown caterpillar is from an inch and one-tenth to an inch and three-tenths in length; the back dark-colored, and covered with tufts of long, blackish-gray hairs; the sides are of a pale-greenish color, with a line between the black and green distinctly marked; the six pectoral feet and head are black, and the ventral and two anal ones are green.

The chrysalides were formed on the 24th of July, in cocoons or loose webs, intermingled with their own hair, and spun under the loose leaves. They were nearly half an inch in length, short and thick in form, and brown in color. The moths came out in about twelve or fourteen days.

The wings of the male measure, when expanded, from nine-tenths of an inch to an inch across, and are white, with one or two black dots near the centre of the upper pair; the eyes are black; the antennæ feathered, and the two fore-legs of an orange color.

The female is much larger than the male, measuring about an inch and one-fifth across the expanded wings. She is very similar to the male in color, but has no black spot on the upper-wing; nor are the antennæ feathered as in the male.

I consider, from the circumstances under which the nest, or web, of caterpillars was found, that it was accident alone which caused their presence on the cotton, as I have never seen them before nor since, in any number, among the plants. Therefore, they may be classed among those insects which cause little or no harm to the general crop.

These moths are similar to the *Arctia textor* of Harris, but appear to differ from them in the spots on the upper-wings of the male, and in some other slight particulars. The habit of webbing up the limbs is also the same.

INSECTS FOUND ON THE TERMINAL SHOOTS.

The insects attacking the terminal shoots of the cotton plant are at present very little known; but when their habits shall have been more thoroughly investigated, there is no doubt that they will be found to be much more destructive than is generally supposed.

No practical planter can have passed through his cotton fields, without frequently observing that the terminal leaves of many of the plants have been webbed up and eaten out, or that many of the young blossoms have suddenly turned

brown, or "flared" open, and, on the slightest touch, fall to the ground. Some of this damage may no doubt be caused by excessive moisture or heat, or by an unhealthy state of the plant itself. But if the ends of all the shoots be closely examined, it will generally be found that several minute insects lie hidden between the folds of the leaves and buds, probably feeding upon the tender foliage, or extracting the sap. The *Aphis*, or cotton-louse, is often found in such places.

The Pea-Green Caterpillar.

In the cotton fields near Tallahassee many of the tender leaves and young blossoms of vigorous and healthy plants were observed to be webbed together in a mass. Upon opening one of them, a small caterpillar, between three-fifths and seven-tenths of an inch in length, was discovered feeding upon the interior. This caterpillar is of a pea-green color, with a dark longitudinal stripe running down the middle of the back, and a row of two dark spots with white centres to each on every segment of the body, except the first, running parallel on each side of the dark stripe. The head is black; the first segment of the same color, with a dividing line of white between it and the head, and another light division between this and the second segment. The pectoral feet are black, and the body sparingly clothed with short bristles, or hairs.

This caterpillar, for the most part, lives and feeds in the terminal shoots; but I have found it webbed up between the outer calyx and boll of the cotton, or in the calyx of the flower.

The chrysalis, which is of a light-brown color, is about two-fifths of an inch in length, and is formed in the same

webbed-up terminal shoot which served the caterpillar as a shelter. It shed the caterpillar skin about the 27th of September, and the perfect moth came out in about ten days.

The moth, when expanded, measures from three-fifths to seven-tenths of an inch across the wings; the body and thorax are of a brown color; the upper-wings light brown, with a band of darker brown running obliquely across them near the centre (one specimen had two dark oblique lines on the upper-wing); a dark triangular mark occurs on the upper side of the wing, between the margin and band, and the margin itself is of a dark brown; the under-wings are of a yellowish brown; the under side of the wings is brown, marked crosswise by darker lines, giving it somewhat a marbled appearance; and the antennæ are threadlike. The distinguishing feature of this small moth is the very long and dark-colored palpi, which are somewhat curved upward, and project from the front of the head like a trunk.

The damage done by these small insects is not so apparent at first as that caused by those of a larger size, such as the boll-worm and others; yet, no doubt, many of the buds and leaves on the terminal shoots are destroyed by them. These webbed-up leaves, however, must not be confounded with the webs made by numerous small spiders, which also select such places for their abodes, and no doubt do good by destroying many young caterpillars and moths.

The Cotton Lygæus.—(*Lygæus?*)

Young cotton-buds are frequently observed at the end of the terminal shoots, turning brown, and eventually dropping off. This has been attributed to the agency of

the young larvæ of the "bore-worm," or "boll-worm," which certainly are sometimes found in the terminal shoots of cotton; but, when this is the case, the buds are generally either eaten from the outer calyx, or the bud itself perforated, and the former flaring open; whereas, the buds which turn black, as before described, are closely enveloped in the outer calyx, and present a triangular form, with a dry and dark-brown appearance.

Upon close examination, a number of extremely minute larvæ, measuring a little over one-twentieth of an inch in length, were found in the injured shoots. The insects, when confined in a bottle with some young terminal cotton shoots and buds, to ascertain if they really injured the plant, were observed immediately to attack each other with great animosity; and, in a short time, one of the strongest larvæ killed and sucked out the juices from three of its companions, and also from a cotton-louse which had been placed in the glass. The same insect, however, was afterward plainly seen, on several occasions, to suck sap from the terminal shoot and young buds; and as there were no more insects for it to feed upon, it must necessarily have perfected its growth and transformations afterward on vegetable juices alone. Almost every terminal shoot which was diseased, had in it one or more of these minute larvæ or perfect insects.

The pupæ are of a reddish brown, about one-twentieth of an inch in length, with eyes of a reddish-brown color. The perfect insect is rather more than one-twentieth of an inch in length, also with reddish-brown eyes, yellowish antennæ, and a head and thorax black; the triangular space between the wings is black; the wings are brownish yellow, barred in the centre with two triangular black marks; the ends of wings diamond-shaped, of a light color; the upper

part of the thigh is black, and the rest of the leg yellowish.

This insect is more especially mentioned here in order to draw attention to the various tribes which attack the terminal shoots of cotton, as at present very little appears to be known about them, and immense numbers of young buds dry up and fall in the manner mentioned above, unobserved from their minute size. Many of them are, no doubt, cast in consequence of atmospheric and various other causes, but as this small insect has been observed sucking the juices from the plant, it may be found that several others do the same thing in different localities. The young boll-worm is, no doubt, found in these shoots; but I very much doubt whether the fallen blackened buds are owing to injuries received from it, as will be seen in the article on that worm. It is true, the young boll-worm causes many immature forms to drop, but in such cases the bud attacked generally shows where the injury has been done by a small puncture.

As several of the *Reduvii* or *Cimicidæ* have the power of stinging man and animals in a very severe manner, with their probosces, or piercers, may they not in some measure possess the same power over vegetable life? The question is merely asked to lead to further inquiries on the subject.

Sap-Suckers.

Another insect found in the young shoots and newly formed bolls, the color of which is green; the eyes reddish brown; the legs green, with the thighs red; the antennæ are four-jointed, and also green, with red at the end of each joint. The pupa is about a quarter of an inch, and the perfect insect is seven-twentieths of an inch, in length;

the antennæ are brown and green, the eyes brown; the thorax somewhat triangular; the anterior part green and shaded with reddish brown posteriorly; the legs, brown and green; the wing-cases with a cross, shaped like the letter X, forming four triangles, those nearer the thorax being reddish brown; the side triangles are green.

I observed these insects, when confined under glass, sucking the sap from the buds and young bolls, their only food. The young eventually completed their transformations into perfect insects. They were observed, moreover, to eject large drops of green sap from their abdomens, which could only have been procured from the buds themselves. As it has been already seen that these insects puncture the bolls and extract the juices therefrom, the question arises whether they do any material injury, either by this extraction of the sap, or by a poisonous sting, like some of the *Reduvii*.

There is likewise another of the same species of insect, which was found perforating the young flower-buds and bolls of the cotton, similar to the above. The head and anterior portion of the thorax are reddish brown, the remainder of the thorax yellow, with a double dark mark in the middle; the wing-cases are brownish black, with two longitudinal lines from the upper outside corner of the wing-cases to the posterior edge, forming a dividing mark somewhat shaped like the letter X.

The Centrinus Perscillus.

This insect is about three-twentieths of an inch in length, of a grayish color, with a rather long, curved rostrum, or bill; was found in the terminal shoots, as well as in the blossom; but I could not perceive that in any way it injured the plant. I have also seen very young boll-

worms in the terminal shoots, but, upon examination, I have generally found the egg deposited upon the outer calyx of a young bud or boll, the parenchyma, or tender succulent substance, of which was mostly eaten, and the young bud pierced or its contents sucked or eaten out.

INSECTS FOUND ON THE FLOWER.

The flower of the short-staple cotton is of a yellowish-white color the first day of its blooming; it then gradually assumes a pinkish tinge toward its outer edge; the second day it partially closes, turns pink, and presents such an entirely different appearance that it can scarcely be recognized as the same flower.

There are several insects which infest this flower, or "bloom," as it is frequently termed, some for the sake of the nectar, or honey; others for the pollen; and a few for the corolla itself.

The Blister-Fly.—(*Cantharis strigosa.*)

Several blister-flies, or cantharides, found in Columbia, South Carolina, were seen to devour the petals of the cotton flower. One of these insects is a little more than half an inch in length, of a reddish-brown color, with the eyes and a spot on the head black. Two long black marks are seen on the thorax, and two longitudinal stripes, also black, on each wing-case; the legs and antennæ are black; and the abdomen protrudes somewhat beyond the wing-cases. Some of them are smaller than others, measuring not quite half an inch in length, and are of a rusty ash-gray white; others are of the same color, but with two broad, longitudinal black stripes on the elytræ. The two last

mentioned vary so much in the distinctness of their stripes, some of them being the medium between the perfectly gray and the striped, that it is somewhat difficult to determine whether they are the same insect or not. The underwings are clouded, and nearly black.

These insects, although they eat holes in the petals, do but little, if any, damage to the crop; yet, together with the *Chauliognathus*, bees, and wasps, may perhaps be beneficial, as serving to fecundate many plants by carrying the pollen from flower to flower.

THE COTTON CHAULIOGNATHUS.—(*Chauliognathus Pennsylvanicus.*)

This insect does not appear to attack the petals in the same manner as the cantharides, just described, but contents itself with the pollen or nectar, which is found in the flower, where it may be often seen so much occupied in feeding as scarcely to take any notice of the approach of mankind. It is so plentiful near Columbia, South Carolina, that four or six may be taken from one bloom alone. When issuing from the flower, they sometimes appear to be so abundantly powdered with pollen as to be perfectly yellow, and no doubt serve in some measure beneficially, as a medium for transporting the pollen and fertilizing other blooms.

This insect is not quite three-quarters of an inch in length; its head, eyes, and antennæ are black; its thorax, orange, with a large dark spot in the centre; its wing-cases are orange yellow, with a black, longitudinal, broad stripe running down each, near the inner margin, leaving a narrow inner and broad outer margin of yellow orange. This black stripe grows broader toward the abdomen, leaving a

narrow stripe, also of yellow, at the end of the elytræ. Its legs are black.

The Yellow-margined-winged Chauliognathus.—(*Chauliognathus marginatus.*)

A small species of chauliognathus is found in Florida, where it appears to take the place of the last-mentioned insect, having the same habits, and occurring in the same places. It is nearly half an inch in length; the head is orange yellow, with a black mark below the eyes, which are also black; the thorax is yellow, with a longitudinal black mark down the centre; the wing-cases are black, edged around the outer and inner margins and the end with orange yellow; the lower part of the thighs is also orange yellow; the upper part and rest of the legs and antennæ are black. This insect frequents the flowers of the cotton, but, as yet, I have never discovered it doing any injury.

The Delta-thoraxed Trichius.—(*Trichius delta.*)

A small beetle, which is little more than two-fifths of an inch in length, is also found in cotton blooms, and sometimes on the bolls. The head is black, including several white marks; the thorax is also black, bordered with yellow, containing a singular triangle of yellow lines, the lower end of which appears as if broken off; the wing-cases are reddish brown, with two oblique black spots on the upper, and two longitudinal black ones enclosing a yellowish mark on their lower parts; the abdomen protrudes the twentieth part of an inch beyond the wing-cases, and is of a yellowish color; the fore-legs are spiny

and of a brown color; the hind-legs are very long, brown; the ends of the tibæ and tarsi black.

From what has been seen of the habits of this insect, and its comparative scarcity, I should not regard it as injurious to the crop, and therefore I would class it amongst those insects frequenting the cotton, but not injurious to it.

Twelve-spotted Galereuca.—(*Galereuca duodecim-punctata.*)

A small leaf-beetle is often found in the young flowers of the cotton, where it gnaws holes in the petals. This insect is about three-tenths of an inch in length; the head is black; the thorax orange green; the wing-cases greenish yellow, with six black spots on each; the upper part of the thighs is green, and the rest of the leg dark-colored, or nearly black.

Among the remedies suggested for destroying the striped cucumber-beetle (*Galereuca vittata*), Dr. B. S. Barton, of Pennsylvania, recommends "sprinkling the vines with a mixture of red pepper and tobacco." Ground plaster and charcoal dust have also been recommended, as well as watering the vines with a solution of an ounce of glauber salts in a quart of common water, or tobacco water. An infusion of hops, elder, or walnut leaves, is said to be very useful; as, likewise, sifting powdered soot upon the plants when they are wet with the morning dew. Others have advised sulphur and Scotch snuff to be applied in the same way.

Dr. Barton likewise states, that "as these insects fly by night as well as by day, and are attracted by lights, burning splinters of pine knots, or of staves of tar-barrels, stuck in the ground during the night around the plants, have

been found useful in destroying these beetles." Similar remedies might possibly apply to the twelve-spotted galereuca.

As these insects are not sufficiently numerous to do any harm to the cotton crop, these remedies are merely mentioned as applying to the cucumber-beetle, or any other pests of the garden or fields, of similar habits.

Span-Worms, or Loopers.—(*Geometræ ?*)

Among the numerous insects which injure the flowers of the cotton plant may be found several caterpillars, many of which are of the kind termed "loopers," or "span-worms," from their peculiar mode of locomotion.

Near Columbus, in Georgia, I found a species of caterpillar which were quite numerous, about an inch and a half in length, and of a bright-green color, eating the petals of the cotton flower, from the 12th of October to the 29th of November. They had six pectoral, four ventral, and two anal feet, and were obliged to loop their bodies when progressing from place to place, after the manner of the so-called span-worms or loopers. Their bodies were green, and slightly hairy. The chrysalides were seven-tenths of an inch in length, and of a green color. The moth, with wings extended, measures about an inch and three-tenths, is of a shaded or clouded blackish brown, with a metallic, gold-colored semicircle near the centre of each upper-wing; a round spot of the same color also lies close to it, but nearer the margin; the under-wings and body are of the same blackish brown. When at rest, the upper-wings come together like the roof of a house; a tuft of hair projects from the upper part of the thorax, and a smaller tuft is found near or between the junction of the wings, which appear to curve up toward the outer margin.

Another Caterpillar

Is of the same habits, size, form, and color, except that it has a white longitudinal line running down each side. The chrysalis, however, is of a dark-brown color, whereas that of the preceding is always green, with dark-brown markings only on the thorax and back. The moth also is similar in shape and color—so much so, indeed, as to warrant a belief that they may be different sexes of the same species.

Mr. Peabody, of Columbus, states that this caterpillar was very destructive to the leaves of turnips in 1854. Several which were placed in confinement, were attacked by a singular and fatal disease. However healthy they appeared at first, they gradually assumed a lighter color, ceased feeding, became swollen, and, suspending themselves by the hind feet to any projecting twig, very soon died and became putrid and black.

These caterpillars were quite plentiful in the vicinity of Columbus, but were not found in Florida the following year. They cannot be classed among insects very injurious, as they were not sufficiently numerous to harm the cotton.

The Small Cotton Span-Worm.

A very small looper-caterpillar, or span-worm, about seven-tenths of an inch in length, of a brown or greenish color, with five yellow and black markings or bands on the middle segments, and of about the thickness of a knitting-needle, was very numerous on the blossoms of cotton in Georgia during the month of October.

These caterpillars have six pectoral, with only two ventral and two anal feet; their mode of progression is by

alternately stretching out and contracting the body in the form of an arch. They are thus enabled to advance nearly half their length every stride or step, and, from this circumstance, derive their common name of "span-worm," or "looper."

The favorite food of these insects appeared to consist of the petals. In some places they were very numerous, as many as four having been taken from one bloom alone. In color, they varied much from green to brown; but both were similarly banded with another color. The chrysalides were fixed by the tail to the leaves with a glutinous matter or silk, and measured about seven-twentieths of an inch in length; were of a brownish-green color, and remarkable for having the upper part of the thorax somewhat square, flat, and furnished with two minute protuberances, or spines, over the head and eyes. When disturbed, they instantly drop from the leaves, and suspend themselves in mid-air by means of a thread, which issues from the mouth; and although exceedingly abundant in one part of the field, yet they were scarcely to be found out of that particular spot.

As these insects are very small, and eat holes in the petals of the flowers alone, they cannot injuriously affect the general crop.

The Larger Span-Worm.

Another span-worm, or caterpillar, appears in the Carolinas, Georgia, and Florida early in October, and feeds upon the petals of the cotton flower. It measures, when fully grown, from an inch and a half to an inch and three-fourths in length; the color is reddish brown, marked with faint, longitudinal darker stripes; the head is somewhat angular, and divided at the top; there is a light spot on

each side, about the middle of the body, and two short excrescences, or warts, on the extremity. In several specimens there are white spots running down each side of the back. The chrysalis is a little more than half an inch in length, and is of a brownish color. The moth measures an inch and three-tenths across the expanded wings, which are of a light, clouded-gray color, with an irregular, dark, oblique line running across the upper-wing, and two others, not quite so distinct, nearer the body. There is also a dark, oblique line, and another fainter one, crossing the under-wing; the margins are scalloped with a darker color; the antennæ are feathered.

This caterpillar feeds upon the petals of the cotton flower, and, when disturbed, assumes a stiff, erect attitude, in which it might easily be mistaken by men or birds, for a dried twig or stick. When about to change, in October, it descends into the earth, becomes a brownish chrysalis, and in about fourteen days the moth appears.

The caterpillars are not very numerous, and therefore can do but little harm to the general crop.

Another span-worm, somewhat similar to the above in shape and color, is very numerous in cotton fields, but feeds upon the bind-weed flower (*Convolvulus*), and does not disturb cotton.

INSECTS FOUND UPON THE BOLL.

During the time that cotton is maturing its seed-vessels, there are several insects of the "plant-bug" species found both upon the young and the old bolls; but whether these insects have any thing to do in producing the rot, is a question which cannot be easily answered before further information shall have been collected upon the subject. I

will here simply give the results of some experiments made by me this season (1855) to determine whether any of these insects do or do not suck the sap from the bolls. In the month of October, several plant-bugs were caught, and placed singly in glass bottles, containing young and middle-sized bolls, and all of those hereafter described were observed with their piercers penetrating the bolls, and busily engaged sucking out the sap.

The Green Plant-Bug.—(*Pentatoma?*)

This insect is about seven-tenths of an inch in length, rather broad, and of a bright-green color; the head is furnished with two ocelli on the upper part; the eyes are brown, and the scutellum, or triangular place between the wing-covers, is very large and also of a green color; the upper part of the body, which is flattened, is margined with an edge of yellow, and has a black spot on the yellow edge of each segment. The piercer, which is long and jointed, when not in use, is recurved under the thorax; the antennæ are five-jointed.

An insect was described by Mr. Bailey, of Monticello, in Florida, as being very numerous in his cotton fields; and his overseer informed me that he had seen it in the very act of piercing a boll, which he afterward cut open, and found that the puncture had penetrated through the outer shell, or case of the boll, to the cotton, and that the mark where the piercer had penetrated was discolored. Those I had in confinement certainly were frequently seen with their trunks inserted into bolls, and sucking the sap.

The larva is very similar to the perfect insect in shape and color, but smaller in size, and is not furnished with wings. The pupa possesses rudiments of wings only, and

it is the perfect insect alone which, by means of a pair of under-wings, concealed beneath the wing-cases, is able to fly about and propagate its kind.

The Gray Plant-Bug.—(*Pentatoma ?*)

The spotted plant-bug is very much of the same shape as that last described, but is not so broad. It is gray, and marked with black dots and lines; it is also smaller than the former, being only three-fifths of an inch in length; the outer margin of the thorax is somewhat pointed or angular; the scutellum, broad and triangular; and the wings, when closed, terminate with a black, diamond-shaped mark, where they overlap; there are two ocelli; the antennæ are five-jointed; and the appearance of the insect is flat, broad, and similar to the so-called "squash-bug" of the North. This insect was often seen with its piercer inserted into a boll, extracting the sap, which was ejected from the abdomen as a bright, greenish liquid.

These insects were found plentifully on the cotton in Georgia, in 1854, and in Florida, in 1855.

The Red-Edged-Winged Reduvius.—(*Reduvius ?*)

A species of reduvius was found in abundance in the cotton fields of Florida, in 1855. The female measures a little more than three-fifths of an inch in length, and the male about half an inch. The head is of a grayish black; the eyes prominent, black, and brilliant; the antennæ are four-jointed; the thorax is triangular, with the angle toward the head, truncated, black, with an edging of red; the wing-cases are reddish, spotted with black, and edged with red, with their ends, where they overlap, black; the legs are black from half way up the thighs, where they are

red; the under-wings are clouded with black veins. It so closely resembles the celebrated "red-bug" of Eastern Florida that it has probably been mistaken for it by many planters, who have stated that the true red-bug is often found in Middle and Western Florida, where none are to be found, though I searched diligently for them.

These insects, when confined in glasses, were not observed to feed upon the sap of the bolls, although it probably does some injury, like the much-dreaded red-bug alluded to above.

THE LIGHT-BANDED-WINGED ANISOSCELIS.—(*Anisoscelis?*)

A species of anisoscelis was found in abundance in the cotton fields both of Georgia and Florida. It appeared to be very active and vigilant, as, however carefully approached, it always flew away with a loud, humming sound. Several of these insects were observed on a large boll, apparently busily employed; but when suddenly disturbed, they dispersed in different directions. Upon examining the boll, the sap was seen exuding from several minute punctures, which was attributed to these insects having bored into the boll for the sake of the vegetable juices contained therein.

The larva, when young, is of a light scarlet or crimson, with two black spots on the back, in which are two black, thorny excrescences, or points; there are also four black, thorny excrescences on each side; the legs, antennæ, and eyes are black; and the hind-legs thicker than the others.

The pupa is brown, with its wing-cases only in an incipient state, and the tibiæ of the hind-legs have already attained a broad, flattened appearance.

The perfect insect is about seven-tenths of an inch in

length; the antennæ are four-jointed; the eyes, prominent and brown; the piercer four-jointed, and, when at rest, recurved under the body; the ocelli are two in number; the thorax rising from the head, and somewhat angular on the margin; the wing-covers are reddish brown, with a distinct yellowish-white band across the middle; the anterior and middle legs are reddish brown; the hind-legs, however, are very singular in shape, the thighs being thick and spiny on their under side, and the tibia furnished with a broad flattened enlargement on each side, larger on the upper one and somewhat wing-shaped, with two teeth, or notches, on the margin. This makes the insect appear to have hind-legs entirely out of proportion to its size. These insects are very numerous in cotton fields, and may be seen flying from plant to plant during the heat of the day.

There are several other insects found upon cotton; but those mentioned above are the most numerous. The question now arises whether they have any thing to do with the "rot," or whether that disease is caused by a peculiar state of the atmosphere, or by imperfections of the soil. May not the punctures made by these insects, in some peculiar seasons, incline the boll to the rot more readily than in others, though in more favorable seasons it may be made with comparative impunity? A singular circumstance, however, is rather against the insect theory, namely, that, while some particular cotton-plant is observed to be much affected by the rot, the plants standing close to it may be comparatively free and healthy. On one diseased plant I counted seventeen rotted bolls, while the very next plants were green, and exhibited not the least sign of disease. The query as to whether the rot is caused by insects or the peculiar state of the soil or atmosphere, is here submitted for the purpose of inciting planters to make experiments,

and to report their success, in order that we may soon come to a definite conclusion upon the subject.

THE BROWNISH-BLACK ANISOSCELIS.—(*Anisoscelis ?*)

A very large anisoscelis, about an inch and one-fifth in length, and of a brownish black, I found quite numerous in the cotton fields of Florida. The head of this insect is brownish black, with prominent eyes; the thorax rough, black, and somewhat triangular; the antennæ, four-jointed; the legs, brown; the thighs, brownish black and spiny; the hind-legs, in appearance, entirely disproportionate in size to the insect; with the thighs very stout, thick, and spiny, and the tibiæ with broad, flattened, wing-shaped projections; the trunk is recurved under the thorax.

These insects, though somewhat numerous, were never observed to suck the sap from the bolls; yet it would be well to investigate their habits more minutely, before deciding whether they are injurious or not.

THE DARK-SHADED CETONIA.—(*Cetonia melancholica.*)

This beetle is found on those bolls which have been bored into by the boll-worm, extracting the flowing sap from the lacerated sides of the wound. As many as five have been taken from the interior of a single boll, which had been previously hollowed out by the worm, and where the sap was flowing very freely. Some planters accuse them of making the holes in which they are found; but most of the bolls examined by me had evidently previously been hollowed out, and the beetles had only entered for the sake of the extravasated sap. Sometimes, however, they may so abrade the skin of a boll as to cause a flow of juice, of which they will avail themselves, as I have occasionally

observed solitary individuals sucking the sap under very suspicious circumstances, where no previous wound had been made by the worm. They can do but little harm, however, to the crop.

This beetle is rather more than half an inch in length; of an ovoid form; greenish, with somewhat of a metallic lustre; across the wing-cases are several whitish spots and short lines; the tail is obtuse, hairy, and protrudes beyond the wing-cases; the legs are rather spiny, of a dark color and metallic lustre.

The Indian Cetonia.—(*Cetonia Inda.*)

I have observed another beetle very abundant in the blooms, and sometimes in the open bolls of the cotton, in Florida, in October, which apparently did no injury. This beetle is three-fifths of an inch in length, and of a brown color, spotted and marbled with a darker brown and black. It flies with a loud humming sound, and is apparently sluggish in its habits when not on the wing.

INSECTS FOUND ON ROTTED BOLLS.

Much has been said about the rotted bolls of cotton, the cause of which has been attributed to insects; and it has been alleged that, if these bolls were well examined, several of the insects causing the disease would always be found inside. It is true, many small insects are found in such rotted bolls, but they have invariably been previously cracked or split open by disease, or bored into by the boll-worm. The fact is, the insects found in such places frequent them merely for the sake of the sap which exudes from the wounds, or for the fungoid growth that generally flourishes in such situations. It is very often the case that

the effect is thus mistaken for the cause, and that insects perfectly innocent are blamed for a disease with which they have nothing to do, except that they resort to the already injured bolls for food or shelter.

The insects in decaying and rotted bolls of cotton are very numerous, but most of them are quite small.

Another Insect—(*Carpophilus?*)

Was found in such bolls as were either bored into by the boll-worm, or had been split open by the rot, and did not appear upon the bolls unless they had been previously injured. I have counted as many as thirty of these beetles in a single diseased boll, and there is scarcely an injured or split boll in some fields in which one or more of them is not to be found. They likewise occur in considerable numbers in the tops of such ears of maize as have been eaten out by the corn-worm (*Heliothes*), (see Report for 1854), and have much of the sap exuding, or are covered with a fungoid growth. They appear to dislike light, and seek shelter in dark places, secure from the rays of the sun.

This insect is about the tenth of an inch in length, and of a brown color; the wing-cases are short, covering only about two-thirds of the abdomen. The larva is a small yellow grub, with six fore-legs and two points at the end of the tail, and is often found in the rotted parts of the bolls.

If this insect were to be found in the bolls before they were already rotted, or to be seen in the act of piercing the outer case, it might, perhaps with reason, be accused of causing the disease; but, as they are never found inside before the rot has commenced, it is very much to be doubted whether they have any thing to do with it, or

merely visit such places for the purpose of obtaining a food suitable to their taste, or a dark sheltered place in accordance with their habits.

THE SQUARE-NECKED SYLVANUS.—(*Sylvanus quadricollis.*)

The larva and perfect insect of this minute beetle has already been figured, in the Agricultural Report for 1854, where it is described as having been found in Indian corn. It also frequents diseased cotton-bolls, most probably for the sake of the seed, which is generally exposed to its attacks, when the boll has been split open by disease.

ANOTHER INSECT

Was also found very numerous in some of the rotted bolls; but as soon as the latter were taken from the plant and opened, the beetles ran off with great rapidity, and endeavored to hide themselves under any substance that would serve as a place of shelter. They appeared to dislike the open light, and were generally found in dark and obscure places.

There were likewise several small insects found in rotted bolls, such as the *Colastus semitectus*, and many others, which it will be unnecessary to enumerate here, as their habits are very much the same as those above mentioned, nearly all of them frequenting such places merely for food and shelter, and not causing the rot in any manner.

The hemipterous insects, heretofore mentioned, certainly do pierce the bolls with their beaks or piercers, for the sake of the sap; for they have been caught in the very act, and this even before any appearance of the rot could be discovered. They might, therefore, perhaps, with

better reason, be suspected of having something more to do with the disease than the small beetles already mentioned. But, even in this case, it would be well to investigate further before coming to a definite conclusion.

The Corn-Worm.—(*Heliothes?*)

The caterpillar producing this small moth, described in the Agricultural Report for 1854 as injurious to the Indian corn in the Southern States, is likewise found in the bolls of cotton which have been split open by the rot, but can have nothing to do with producing the disease. It most probably feeds upon the seeds contained in the rotted bolls.

The chrysalis is formed in a cocoon inside the boll; it is about one-fifth of an inch in length, of a brown color, and formed in a cocoon of silk, interwoven with fæces and dust from the boll.

The caterpillar is about three-tenths of an inch in length, of a reddish or pink color, with the head and part of the first segment brownish. It has six pectoral, eight ventral, and two anal feet, and is able to suspend itself by a thread, when disturbed. The body is slightly covered with a few short hairs.

The moths appear in about fourteen days in warm weather, and, when expanded, measure nearly two-fifths of an inch; the upper-wings are of a shaded chestnut brown, mottled with darker brown and black; the tips of the wings are marked with dark spots; the under-wings are very narrow, brown, and deeply fringed with fine hairs, presenting almost the appearance of feathers. The insect, when at rest, places the upper wings together, forming a ridge with the extremity turned up. There appear to be

several generations of these insects during the season, and, although found in rotted bolls, they are perfectly harmless as to the causing of disease.

There are several other insects found in rotted bolls which it will be unnecessary here to describe; for, although, as before stated, they are found in bolls already split open by the rot, or eaten into by the worm, yet they are no more the cause of the disease than the woodpecker is the cause of the death of the tree out of which it extracts the insects which have already accomplished its destruction.

The Boll-Worm.—(*Heliothes?*)

The egg of the boll-worm moth is generally deposited on the outside of the involucel, or outer calyx of the flower, and I have taken it from the outer calyx even of the young boll itself. It has been stated that the egg is laid upon the stem, which also forms the first food of the young worm; but after a thorough and careful examination of several hundred stems, I found only one egg in this situation, and that, from its being upon its side instead of its base, had evidently been misplaced, and never hatched.

The egg of the boll-worm is laid singly upon the involucel about twilight, and is of a somewhat oval shape, rather flattened at the top and bottom, and is formed with ridges on the side, which meet at the top in one common centre. The color is yellowish until nearly hatched, when it becomes darker, the young enclosed caterpillar showing through the translucent shell. A single boll-worm moth, dissected by Dr. John Gamble, of Tallahassee, contained at least five hundred eggs, which differed much from those of the cotton caterpillar moth, which are round and flattened like a turnip, of a beautiful green color, and scarcely

to be distinguished from the leaf on which they are deposited. The eggs of the boll-worm moth hatched in three or four days after being brought in from the field, and the young worms soon commenced feeding upon the parenchyma, or tender fleshy substance of the calyx, on the outside, near where the egg was laid. When they had gained strength, they pierced through the outer calyx, some through the petals into the enclosed flower-bud, while others penetrated the boll itself. Sometimes the pistil and stamens are found to be distorted and discolored, which is caused by the young worm, when inside the bud, eating the stamens and injuring the pistil, so that it is drawn over to one side. When this is the case, the young worm bores through the bottom of the flower into the young boll before the old corolla, pistil, and stamens fall off, leaving the young boll, inner calyx, and outer calyx, or involucel, still adhering to the foot-stalk, with the young worm safe in the growing boll.

The number of buds destroyed by this worm is very great, as they fall off when quite young, and are scarcely observed as they lie, brown and withering, on the ground. The instinct of the caterpillar, however, teaches it to forsake a bud or boll about to fall, and either to seek another or to fasten itself to a leaf, on which it remains until the skin is shed; it then attacks another bud or boll in a similar manner, until, at length, it acquires size and strength sufficient to enable it to bore into the nearly-matured bolls, which are entirely destroyed by its punctures; for, if the interior is not devoured, the rain penetrates the boll, and the cotton soon becomes rotten and of no value.

The rotted bolls serve also for food and shelter to numerous small insects, such as those already mentioned, and which have been erroneously accused of causing the rot.

Whenever a young boll or bud is seen with the involucre, or outer calyx, called by some the "ruffle," spread open, it may be safely concluded that it has been attacked by the worm, and will soon fall to the ground and perish. The older bolls, however, remain on the plant; and, if many of the fallen buds or bolls be closely examined, the greater portion of them will be found to have been previously pierced by the worm, the few exceptions being caused either by the minute punctures of some of the plant-bugs, from rain, or other atmospheric influences. Those injured by the worm can be distinguished by a small hole on the outside where it entered, and which, when cut open, will generally be found partially filled with small fragments of fæces.

When very young, the boll-worm is able to suspend itself by a thread, if blown or brushed from the boll or leaf on which it rested. After changing its skin several times, and attaining its full size, the caterpillar descends into the ground, where it makes a silky cocoon, interwoven with particles of gravel and earth, in which it changes into a bright chestnut-brown chrysalis. The worms, which entered the ground in September and October, appeared as perfect moths about the end of November.

A boll-worm, which was bred from an egg found upon the involucel, or ruffle of the flower-bud, grew to rather more than a twentieth of an inch in length by the third day, when it shed its skin, having eaten in the mean time nothing but the parenchyma, or tender fleshy substance from the outside. On the fifth day it bored or pierced through the outer calyx, and commenced feeding upon the inner; and, on the sixth day, it again shed its skin, and had increased to about the tenth of an inch in length. On the tenth day it again shed its skin, ate the interior of the

young flower-bud, and had grown much larger. On the fourteenth day it, for the fifth time, shed its skin, attacked and ate into a young boll, and had increased to thirteen-twentieths of an inch in length. From this time it ate nothing but the inside of the boll, and on the twentieth day the skin was again shed, and it had grown to the length of an inch and one-tenth, but unfortunately died before completing its final change.

These moths probably lay their eggs on some other plants when the cotton is inaccessible, as a young boll-worm was found this season in the corolla of the flower of a squash, devouring the pistils and stamens; and, as there is a striking similarity between the boll-worm and the corn-worm moth, described in the Agricultural Report for 1854, in the appearance, food, and habits, alike in the caterpillar, chrysalis, and perfect state, it will perhaps prove that the boll-worm may be the young of the corn-worm moth, and that the eggs are deposited on the young boll, as the nearest substitute for green corn, and placed upon them only when the corn has become too old and hard for their food.

Colonel B. A. Sorsby, of Columbus, Georgia, has bred both these insects, and declares them to be the same; and, moreover, when, according to his advice, the corn was carefully wormed on two or three plantations, the boll-worms did not make their appearance that season on the cotton, notwithstanding that, on neighboring plantations, they committed great ravages.

The worms, or caterpillars, have six pectoral, eight ventral, and two anal feet, and creep along with a gradual motion, quite unlike the looping gait of the true cotton caterpillar, and vary much in color and markings, some being brown, while others are almost green. All are more or less

spotted with black, and slightly covered with short hairs. These variations of color may perhaps be caused by the food of the caterpillar. Some planters assert that, in the earlier part of the season, the green worms are found in the greatest number, while the dark brown are seen later in the fall, as we know is the case with the cotton caterpillar.

The upper-wings of the moth are yellowish, in some specimens having a shade of green, but in others of red. There is an irregular dark band running across the wing, about an eighth of an inch from the margin, and a crescent-shaped dark spot near the centre; several dark spots, each enclosing a white mark, are also discovered on the margin; the under-wings are lighter colored, with a broad, black border on the margin, and are also veined distinctly with the same color. In the black border, however, there is a brownish-yellow spot, of the same color as the rest of the under-wings, which is more distinct in some specimens than in others, but may always be plainly perceived; there is also, in most specimens, a black mark or line in the middle of the under-wings, on the nervure; but, in some, it is very indistinct.

These moths multiply very rapidly; for, as I have before observed, one female moth sometimes contains five hundred eggs, which, if hatched in safety, would rapidly infest a whole field, three generations being produced in the course of a year.

In an interesting communication from Colonel Benjamin F. Whitner, of Tallahassee, he states that the boll-worm was scarcely known in his neighborhood before the year 1841; and yet, in the short period of fourteen years, it had increased to such a degree as to have become one of the greatest enemies to the cotton on several plantations in that vicinity.

It has been recommended to light fires in various parts of the plantations, at the season when the first moths of this insect make their appearance, as they are attracted by light, and perish in great numbers in the flames; and, if the first brood of females be thus destroyed, their numbers must necessarily be reduced, as it is highly probable that it is the second and third generations which do the principal damage to the crops. Some successful experiments in killing these moths with molasses and vinegar were made by Captain Sorsby, a year or two ago, which I here describe in his own words:

"We procured eighteen common-sized dinner-plates, into each of which we put about half a gill of vinegar and molasses, previously prepared in the proportion of four parts of the former to one of the latter. These plates were set on small stakes, or poles, driven into the ground in the cotton fields, one to about each three acres, and reaching a little above the cotton plant, with a six-inch-square board tacked on the top, to receive the plate. These arrangements were made in the evening, soon after the flies had made their appearanee. The next morning we found from eighteen to thirty-five moths to each plate. The experiment was continued for five or six days, distributing the plates over the entire field, each day's success decreasing until the number was reduced to two or three to each plate, when it was abandoned, as being no longer worthy of the trouble. The crop that year was but very little injured by the boll-worm. The flies were caught in their eagerness to feed upon the mixture, by alighting into it, and being unable to make their escape. They were doubtless attracted by the odor of the preparation, the vinegar probably being an important agent in the matter. As flies feed only at night, the plates should be visited late every

evening, the insects taken out, and the vessels replenished, as circumstances may require. I have tried the experiment with results equally satisfactory, and shall continue it until a better one is adopted." It might be well also to try the lantern-trap before mentioned, as another means of destruction, and likewise the method of poisoning recommended in the general remarks on insects. As it appears from Colonel Sorsby's communication that the moth is attracted by, and feeds with avidity upon molasses and vinegar, could not some tasteless and effective poison be mixed with this liquid, so that all the early moths which might partake of it would be destroyed before laying their eggs?

A long caterpillar, measuring from an inch and three-fifths to an inch and nine-tenths in length, and with a thick body, is sometimes found in bolls of cotton in similar situations as the boll-worm. It feeds likewise upon the leaf, and some specimens, which were confined in a box, devoured green corn from the ear. These insects vary much in color, some being of a beautiful velvet black, while others are considerably lighter. The head of the caterpillar appears small for the bulky size of the body, and is black, with two stripes of yellow, forming an angle on the front. On each side of the back runs a longitudinal line, and below the spiracles is seen another line of a reddish or ruddy color. The under part is of a light brown. It has six pectoral, eight ventral, and two anal legs, and its mode of progression is by a gradual creeping, the same as the boll-worm.

The chrysalides were formed under ground, in cocoons of earth, agglutinated with silk, and were about four-fifths of an inch in length, and of a brownish color.

The moth measured an inch and three-tenths across the expanded wings; the upper pair were of a brownish color,

marked on the margin with an irregular band of dirty cream-color, marked with black spots on the extreme outer edge. In the centre of each wing was an oblique line of the same color; the body was brown; the under-wings of a dirty, yellowish white, with a dark shade near where they touch the upper-wings; the antennæ were threadlike.

The eggs producing these worms were found deposited in clusters in September, and not singly, like those of the boll-worm. The old caterpillars are subject to a disease which often proves fatal; and hence it is difficult to raise them in confinement. When attacked, they appear to bloat or swell very much, become full of a watery pulp, suddenly cease to feed, and soon perish, when the outer skin turns black, and the inside is found to be full of a liquid, putrid matter. Perhaps, if they were not subject to this disease, these caterpillars might do as much damage to the cotton as the boll-worm; but, being generally not very numerous, they cannot do much injury.

The same remedies will do for these worms, or caterpillars, that have been recommended for the boll-worm.

The Striped Pale-Green Caterpillar.

There was another caterpillar found feeding upon the leaves of the cotton plant, near Columbus, in Georgia, which sometimes buried itself in the bolls, in the same manner as the boll-worm. It was about an inch and a half in length, of a pale-green color, with wavy, longitudinal stripes of a lighter color on the back, and with a longitudinal black line running down each side, thicker and darker on the fore part of the head. Under this was a broader line, nearly white, tinged with light red or reddish brown. On each side of every segment was a small black spot. It had six pectoral, eight ventral, and two anal feet.

Most of these caterpillars were found about the 20th of October, but, unfortunately, died before completing their final change. They were not numerous on the plantations, and therefore could do but little damage.

The Red Bug, or Cotton-Stainer.—(*Lygœus?*)

This destructive insect is found by millions in East Florida, on the cotton plantations, where it does immense damage by staining the fibre of the cotton in the bolls, and rendering it unfit for use where pure white fabrics are required. Some specimens were found near Jacksonville, in October, on the open bolls, under the dried calyx, and congregating together on the dead leaves under the plants, or on rotten logs or decayed wood. Several of the open bolls were actually red with these insects, exhibiting every stage of growth, from the larva to the perfect bug, all clustered together in such masses as almost to hide the white of the cotton itself. The beak, or rostrum, is four-jointed, with the end blackish, and when not in use, is recurved under the thorax, which is somewhat triangular in shape, with the anterior part red; a narrow, distinct band of whitish yellow divides the thorax from the head; the posterior part is black, edged between the thorax and wing-cases with whitish yellow; the scutellum is triangular, red, and edged with a distinct line of whitish yellow on each side, and partly down the centre of the wing-case; the elytræ, or wing-cases, are flat, brownish black, and containing two distinct X-shaped whitish-yellow lines on them, intersecting each other near the centre; the wing-cases are also edged with a distinct yellowish line, as far as the X. The body is flattened, and in the female projects on each side beyond the wing-cases, showing the bright red of the

abdomen, and contrasting with the dark color of the wing-cases. The under-wings are hidden under the upper wing-cases, and are transparent, veined, and of a yellowish color, clouded with black. The thighs of the fore-legs are somewhat spiny near the tibiæ, and of a red color. The tibiæ and tarsi are black; the under part of the body is bright red, with rings of yellowish white running around it, on the edge of each segment.

The female produces about one hundred eggs; the young larva is completely red, almost scarlet, with distinct whitish-yellow bands around the body, on the edge of each segment. The thighs are red, with the tibiæ, tarsi, and antennæ blackish.

The pupa differs only in size, and in having the unformed wing-cases very small and black, contrasting strongly with the vivid red of the body.

The perfect male is about three-fifths of an inch in length, and the female about seven-tenths of an inch, from the head to the end of the abdomen. They are similar in shape and color, differing only in size. The head and eyes are red, the antennæ black, with four long joints.

The following communication on the subject of this insect was received from Mr. B. Hopkins, of Jacksonville, a practical sea-island planter, of nearly thirty years' experience:

"The 'red bugs,' or, as they are sometimes properly denominated, the 'cotton-stainers,' generally make their appearance about August, or late in July, which is near the usual season for cotton to begin to open. They can readily be distinguished from other bugs, harmless in their nature, by their being of a red color, and more sluggish in their movements. The nearer the fruit advances toward maturity, the more injury they do to the cotton. The

pod, or boll, is perforated by this bug. Whether the staining matter is imparted to the fibre of the cotton during the perforation directly, or by a slow process diffusing itself with the sap abounding at that time in the pod, is not yet ascertained. I am of the latter opinion, from the fact that almost the entire product of the boll is discolored when it opens, which does not seem at all to cause a premature development. As winter approaches, they gradually retire, and take refuge among the logs, or burrow into the soil at the root of the cotton plant, where they hybernate. After a wet season, in winter, they may be found in hundreds on the sunny side of the stalks, enjoying the genial atmosphere, until toward evening, when they again retire. They can be kept down very easily, when there are not more than five acres planted to the hand.

"I have been in the habit of offering a reward every night to the negro that brings in the greatest quantity, each of whom is furnished with a pint bottle, suspended across the shoulders, into which, as they pass along picking the cotton, they deposit all they can discover. In many instances I have seen the bottle filled by one negro in a day. They may also be greatly reduced by destroying them when they come out in winter, in their half-torpid state; a torch of fire in that case is best. They may be buried a foot under ground, and most of them will still escape from their inhumation. If there should be stumps or trees in the fields, they should be burned, and that will generally reduce the quantity for a year or more. In fact, when they receive timely and proper attention, they need not be dreaded.

"No process that I know of can extract the stain produced in the bolls; it is indelible, and considerably reduces the price of the cotton in the market. These insects

have been much on the increase for the last ten years, which I attribute to the excess in planting, as well as the want of proper efforts for their destruction."

It has been stated by other planters, that the fæces of the insect produce the reddish or greenish stain, and that the red-bugs will collect where there are splinters or fragments of sugar-cane. Advantage has already been taken of this habit to collect them by means of small chips of sugar-cane, when they may be destroyed by boiling water; and as they also collect around piles of cotton-seed, they may thus be easily decoyed, and then killed, either by fire or hot water, when congregated. All stumps and dead trees standing in the field should be well burnt out. The experiment of destroying them by means of the crushed sugar-cane and poison has been tried; but, as no report of the experiment has been received, it remains doubtful whether it can be recommended or not.

INSECTS FOUND IN THE COTTON FIELDS—NOT INJURIOUS TO THE CROP.

(*Zanthidia niceppe.*)

There are many other insects found in cotton fields, which are perfectly harmless to the plant, although the larvæ of many of them subsist upon the weeds which grow between the rows or around the edges of the plantation.

Among these insects we find butterflies, in general, one species of which is frequently seen hanging over the ground by hundreds, around moist and damp places. The caterpillar of this fly is of a deep-green, velvety appearance, with a yellowish longitudinal line running down each side. It was found upon the *Cassia Marylandica*, and measured an inch and one-fifth in length. The chrysalis is greenish,

with a very pointed head, and fastened to the branch or leaf by the tail, and by a thread fastened at each side and passed over its back.

This butterfly is about an inch and four-fifths across the expanded wings, which are of an orange color, with a broad, black border around the edges.

The Argynnis Columbina.

The caterpillar of another butterfly is often found on cotton plants, where it has wandered from its natural food, which consists of the wild passion-flower, so often found growing as a weed amongst the crops. It is about an inch and two-fifths in length, of a bright-chestnut color, with two longitudinal black stripes along the sides, and a broken line of yellowish white inside of each black stripe; it has two long, projecting, black horns, or protuberances, on the first segment of the body. When about to change, it selects a place under a leaf, branch, or fence, where it spins a small spot of silk, to which it suspends itself by its hind-legs; the skin of the fore part of the body then splits open, and the chrysalis makes its appearance, also hanging suspended by means of several small hooks, with which the end of the tail is furnished, and which, during the disengagement of the skin, becomes entangled in the silk.

The chrysalis is about seven-tenths of an inch in length, of a pale, whitish green, containing black marks and brilliant metallic, golden spots. These chrysalides, however, together with those of the great American frittellary butterfly, are often destroyed by the larvæ of a small fly.

The butterfly makes its appearance in summer in a few days, and measures from two inches and a half to three inches across the expanded wings. It is of a bright chestnut-brown, barred and spotted with black.

GREAT AMERICAN FRITTELLARY.—(*Agraulis vanillæ.*)

The caterpillar of this butterfly is of a light chestnut-brown color, with a dark, longitudinal stripe down each side, and is shaded with black below the spiracles. It measures about an inch and a half in length, and is covered with sharp, thorny spines; two spines are also found upon the top of its somewhat square-shaped head.

The chrysalis, which is shaded with brown and drab, is about an inch and a tenth in length, and hangs suspended by the tail from trees, shrubs, and fences.

The butterfly measures from two inches and three-fourths to three inches and a fourth across the wings; the upper sides of which are of a bright rich chestnut-brown, spotted and marked on the veins with black. The under-side is beautifully marked with large, metallic, silver spots.

ANTS.

Whenever the plants are infested with cotton-lice (*Aphides*), myriads of small ants may be seen running hurriedly up and down the stems and leaves, or leisurely moving amongst the lice, quietly tapping first one and then another with their antennæ, or feelers, and occasionally making a dead halt where they find a sufficiency of this insect food. Many planters suppose that these ants are the parents of the lice; others again suspect them of destroying the aphis; neither of which, however, is the case, as the ants merely visit the colonies of lice to devour the sweet, gummy substance that exudes from the tubercles on the bodies of the aphides, and which is commonly called "honey-dew," from the erroneous impression that it is formed in the atmosphere, and then deposited in the form of dew upon the upper surface of leaves. This honey-

dew, however, is a sweet liquid, ejected from the anal tubercles of the cotton-louse, and elaborated in its own body, from the sap which had previously been extracted from leaves or young shoots, and which, if not immediately devoured by the ants, is ejected by the plant-louse, and falls in drops upon the upper portions of the leaves that are beneath, making them appear as if varnished, or, if old, causing the places thus defiled to be black and rusty, as if affected with a black mildew, or rust.

The ants feed voraciously upon this honey-dew, when fresh, and cause the aphides to eject the substance at will, by merely tapping their abdomens with their antennæ; the drop ejected is immediately devoured by the ants, and other aphides are visited and subjected to the same treatment, until the appetites of the ants are satisfied, when they either loiter about the leaves or descend to their nests in the ground. Ants are of utility in devouring any weak or disabled insects they may encounter in their path, or in consuming any animal substances which might otherwise contaminate the air.

Ants are generally divided into "males," "females," and "neuters." The males and females, at one stage of their growth, are furnished with wings, which the female gnaws or casts off when about to form a colony. The neuters afterward form the general mass. There are several varieties of the ant found in the cotton fields, of very different habits and appearance. The most numerous make a hole in the earth, and form a sort of hillock around it, of the grains of earth or sand brought up from below the surface of the ground, and from this nest they make excursions in every direction in search of food.

There is also another species—"red ants," so called, but in reality belonging to the family *Mutillidæ*. They are

found singly upon the ground in plantations, and sometimes measure half an inch in length. Their color is a vivid, velvety red and black. They are able to inflict painful and severe wounds with a long sting with which they are provided. There are also three or four species of small ants, exceedingly troublesome in some of the Southern houses, where they find their way into pantries, closets, boxes, or trunks, however closed, and devour any eatable article which may fall in their way. The only means of preventing the ravages of these insects is to isolate the article to be preserved in a vessel of water, or to put all four of the legs of the table, on which the articles may be placed, into vessels filled with water.

The smaller ants, however, have a formidable enemy, the ant-lion, which, in the larva state, forms a funnel-shaped hole in the sand, near the ants' nests, in the bottom of which it lies concealed, all except its jaws, and waits with patience in this den for any ant that may chance to pass along the treacherous path. The ant, suspecting no harm, reaches the edge of the pit-fall, and, the loose sand giving way, it is precipitated to the bottom, where the larva of the ant-lion immediately seizes it with its jaws, and, after sucking out its juice, casts the empty skin away. Should the unfortunate ant, however, elude the first assault of the ant-lion, and endeavor to escape by climbing up the steep sides of the funnel-shaped hole, the ant-lion throws repeated showers of sand with such precision upon the unfortunate victim that it very seldom fails to overwhelm and bring it within reach of its jaws, when it is seized and its juices extracted as above described.

The perfect insect of the ant-lion much resembles the dragon-fly in form and general appearance; it is also furnished with four veined wings, by means of which it is

enabled to transport itself from place to place. The antennæ, however, are much longer, and the larvæ of the dragon-fly are decidedly aquatic, instead of living upon the land, like those of the ant-lion.

INSECTS BENEFICIAL TO COTTON.

Spiders.

Spiders, in cotton or grain fields, are decidedly beneficial, inasmuch as they wage perpetual war against other insects, and are incessantly on the watch to catch and destroy all which, in their erratic flights, happen to become entangled in their webs.

One spider makes a very singular nest for her young, of fine silk, webbed up and closely woven together in the shape of a basket with a round bottom, and most generally placed on or near the top of the cotton plant. This basket is furnished with a cover fitting closely to the top, and is filled with eggs. When the young spiders are hatched, they creep from under this cover, and eventually disperse over the web, which is comparatively large and strong, and stretched from plant to plant. The old female spider appears to brood over this nest, displaying much maternal solicitude for the safety of her infant progeny; for, if forced away, she immediately returns, and will suffer herself almost to be torn limb from limb, rather than desert her precious charge.

The habits of the different species of spiders are very dissimilar; for, while some are almost entirely stationary all their life-time, others are continually moving about, roaming from leaf to leaf, and living entirely by hunting. Many spin their nets from plant to plant, to entrap unwary insects, and generally stay quietly at home in comfortable

webs securely sheltered from the sun and rain, under or between the leaves, waiting patiently for every stray moth that is so unfortunate as to fly into their nets. With the fore-feet carefully placed on a line leading to the radiating net-work, in order to feel the tremulous motion imparted to it by the unavailing efforts of any captive insect to escape, the spider remains perfectly motionless until some straggling fly happens to become entangled. when it immediately rushes down the central line, and, after tying the limbs of its unfortunate victim with a loose web of silk, in order to arrest its struggles for life, deliberately gives it the death-wound, drags the carcass to its den, and devours it at leisure. Other spiders hunt for and capture their insect prey in a manner similar to that practised by the cat. One of them at first approaches an unconscious victim so gently as not to awaken its suspicion, at the same time taking advantage of every inequality of stem or leaf, in order to conceal itself, until within springing distance, and then jumping suddenly upon its back, killing it with its powerful hooked fangs. It then sucks out the whole of its juices, leaving only the empty skin, to be blown away by the wind.

Another description of a small spider, about the tenth of an inch in length, of a light-drab color, with two or more dark spots on its back, was found very numerous inside of the involucre, or ruffle, of the cotton bloom, bud, and boll, where it is said to be useful to the planter in destroying very young boll-worms. In many cases, where the eggs of the boll-worm moth had been deposited and hatched out, and the young worms had eaten through the outer calyx, and already partially pierced a hole in the young bud, or boll, it was frequently observed that no worm could be discovered inside; but upon opening such

a ruffle, this small spider was almost invariably found snugly ensconced in its web; hence it was surmised that the young worm had entered between the ruffle and the boll, or bud, and had been destroyed by the spider, the nest of which was found in such situations.

As all spiders are in the habit of destroying small, noxious insects, they may be regarded as beneficial, especially when the crops are preyed upon by the larvæ of very small flies, such as the wheat midge, the Hessian fly, and many others. These insects, being constantly on the wing, flying about from plant to plant, to deposit their eggs, are very apt to become entangled in the webs, and to be there destroyed.

The spider itself, however, has enemies, one of which is the "mud-wasp," so called. This insect builds cells of clay in out-houses, and under beams, or in other sheltered places. Their nests resemble small pieces of mud thrown up against a roof or wall, when wet, and afterward dried by exposure to the air.

THE CAROLINA TIGER-BEETLE.—(*Megacephela Carolina.*)

This beetle belongs to the family *Cicindeladæ*, otherwise called "tiger-beetles," from their savage propensities, and the beautiful spots and stripes with which their metallic wing-cases are adorned. These beetles are always hunting about the ground in search of insect food. A smaller and darker species especially delights in the glare and heat of the mid-day sun; and, when disturbed, flies only a short distance, alighting with its head directed toward the object which has excited its alarm.

The larvæ of the tiger-beetle inhabit cylindrical holes in the earth, and, in these burrows, they wait patiently for

any passing insect that may be crawling about on the ground, which, when within reach, is seized, dragged to the bottom of its subterranean den, and there devoured at leisure. They are of a dirty yellowish white, and are furnished with two hooks on the back. In the Southern States, they are often taken by the boys, by means of a piece of grass or straw, which being inserted into their dens, is seized by the insect in its crooked jaws, and held with such tenacity that it will not let go until, by means of a sudden jerk, it is brought to the surface of the ground and secured.

The Carolina tiger-beetle is about seven-tenths of an inch in length, of a most beautiful metallic blue, violet, and green; and, when placed in certain positions, it assumes the lustre of bronze or gold. It may also be known by a yellowish curved spot on the extremity of each wing-case. It appears not to be so partial to the light of the sun as some other species, but often conceals itself under stones. It is also seen much more frequently in the cotton fields during cloudy weather, or toward evening, than in a fervid mid-day sun.

The Predatory Beetle—(*Harpalus ?*)

A beetle belonging to the genus *Harpalus*, is very beneficial to the cotton planter, inasmuch as its food consists principally of other insects, and of dead putrescent substances. Numbers of them may be seen running about the surface of the ground in search of food, and when disturbed, hide themselves under grass, roots, or stones. The formation of their jaws is peculiarly adapted to a predatory life. As they are very strong, and hooked at the extremity, they are enabled to seize and hold fast any soft-bodied insect, which they generally kill and devour.

It should here be mentioned, however, that the larvæ of an insect of this species have been accused in Europe of feeding upon the pith and stems of grasses and succulent roots, but at the same time it is stated to feed also upon the larvæ of other insects.

Another very similar insect (*Zabrus gibbus*), both in the larva and pupa state, is said to be injurious to wheat in Europe; and although the two last mentioned may be injurious to vegetation, yet, as a general rule, the *Carabidæ* are carnivorous, and destroy multitudes of insects in the larva, pupa, and perfect state.

THE DEVIL'S COACH-HORSE.—(*Reduvius novenarius.*)

This insect abounds in the city of Washington, during the summer and autumnal months, and is very useful in destroying the disgusting caterpillars which swarm on the shade-trees. The eggs are deposited in autumn upon branches, and are hatched in May or June. When young, the insects have abdomens of a bright-red color, with some dark or black spots on their backs. The head and thorax are black. When they shed their skins, they are grayish in color, and display only the rudiments of wings. It is only in the last stage that they acquire perfect wings, when they are capable of flying with great vigor.

The perfect insect measures about an inch and a quarter in length. It destroys multitudes of noxious insects, in every stage of their growth, and is therefore highly beneficial; but, at the same time, it is dangerous to man, if handled incautiously, as the punctures made by its piercer are often followed by severe consequences. When about to attack another insect, it advances toward its prey with a most cautious and stealthy gait, lifting up and putting

down its feet apparently in the same careful manner as a pointer when approaching his game. When near enough to make the fatal dart, it plunges its piercer into the unfortunate caterpillar, and deliberately sucks out its juices. A small specimen experimented with, was placed in a box with ten caterpillars, all of which it destroyed in the space of five hours.

The Ichneumon Fly.—(*Ichneumon?*)

An ichneumon fly was found in the cotton fields near Columbus, in Georgia, busily employed in search of some caterpillar in the body of which to deposit its eggs, as is generally the habit of this class of flies. The eggs being hatched within the caterpillar, the larvæ devour the fatty substance, carefully avoiding all the vital parts, until they are fully grown, when the caterpillar, having in the mean time changed into a chrysalis, with the devouring larvæ in its interior, the life of its unresisting victim is destroyed, and the grubs change into pupæ, and eventually emerge from the chrysalis skin perfect ichneumon flies, to deposit their eggs in other caterpillars.

These insects are generally seen running about plants infested with caterpillars or worms, continually jerking their wings, and anxiously searching in every cranny and crevice in quest of a subject, in which to form the nest and provide food for their young.

The circumstance of this fly's coming from the skin or case of the moth, or butterfly, is the cause of the mistakes so often made by persons not well versed in natural history; for, when a caterpillar is confined in a glass, and after the change to a chrysalis has taken place, when the real moth is expected to come out, and this fly makes its

appearance, the young naturalist concludes, of course, that the fly is produced by the caterpillar; whereas the rightful tenant of the chrysalis-case had been previously displaced and devoured by the larva of the ichneumon fly, which was produced from an egg placed by the parent fly in the body of the caterpillar. This fact is here noticed in consequence of some drawings of insects injurious to cotton having been sent to the Patent Office, among which an ichneumon fly was figured as proceeding from the chrysalis of a caterpillar. This was correct, inasmuch as it was the parasite which had devoured the chrysalis, but not true when intended to represent the perfect insect as naturally proceeding from the caterpillar itself.

Some chrysalides of the cotton caterpillar, which had been preserved during the autumn of 1855, as an experiment to try whether they would live until the following spring, having been hatched out prematurely by the heat of the room in which they were kept, two ichneumon flies were produced of a slender shape, and about half an inch in length; the abdomen or body of the female was black, and marked with seven light-colored, yellowish, narrow rings around it; the head was black, with the eyes brown, the antennæ long, jointed, and nearly black; on the head were three ocelli; the thorax was black; the wings transparent, of a rather yellowish tinge, veined with black, and having a distinct black mark on the outer margin of the upper pair; the first joint of the hind-leg was comparatively large, thick, and of a brownish color; the thighs were also brown; the tibiæ black, with a broad white band in the middle; the tarsi were white, tipped with black; and the ovipositor protruded more than the tenth of an inch. The male presented much the same appearance as the female, but was more slender in form.

The Smaller Ichneumon Fly.—(*Ichneumon?*)

The ichneumon fly which destroys the aphis, or louse, so very injurious to the cotton plant, is a minute insect, not quite the twentieth of an inch in length. The head and thorax are black, and the legs and abdomen of a yellowish color. Although so extremely small as to be unobserved, it is constantly engaged in exterminating the cotton lice, myriads of which it destroys by preying upon their vitals. The female fly lays a single egg in the body of each louse, which, when hatched, becomes a grub. This grub devours the interior substance of the aphis, leaving only the gray and bloated skin clinging to the leaf. This skin serves the young larva for a shelter, where it remains until it changes into the perfect fly, when it emerges from a hole gnawed through the back, and issues forth furnished with four transparent wings, to recommence the beneficial labor of depositing more eggs in the surrounding colonies of lice on the neighboring plants.

The number of lice destroyed in this way can be more fully appreciated by observing the multitude of empty gray and bloated skins, more or less scattered over the cotton plants infested, each skin having a hole in the back through which the perfect fly has escaped.

The Syrphus.

The larvæ of this syrphus are found wherever aphides, or plant-lice abound, and present the appearance of small, yellowish-white, naked maggots, or grubs, of about a fifth of an inch in length. Their color is brown, with six distinct yellow spots on the first three segments of the body, and the sides are also marked on the margin with yellow;

the body is somewhat hairy. The head is armed with powerful jaws, and gradually tapers to a point, while the tail terminates abruptly as if cut off.

The parent fly deposits her eggs amongst the lice, in order to insure an adequate supply of food to each grub. These eggs are soon hatched by the heat of the sun, and the young grub immediately commences crawling about the leaf; and, being blind, incessantly gropes and feels around on either side in search of cotton or plant lice, its natural food, one of which, being found by the touch, is instantly seized, elevated above the surface of the leaf on which it is quietly feeding, in order to prevent the struggling victim from using its feet, or clinging to the leaf when endeavoring to escape from its voracious destroyer. After piercing the living insect the grub leisurely sucks out the juices, throws away the empty skin, and recommences feeling about in search of another, which, when found, is treated in the same way. When ready to change, the syrphus maggot fastens itself to a leaf or stalk, by means of a glutinous secretion from its own body, and the outer skin contracting into a pear-shaped case, soon hardens by exposure to the air, and the pupa is formed inside.

After a few days, during the heat of summer, the perfect fly emerges from a hole, at the blunt end of the case, to lay eggs amongst the colonies of lice on the neighboring plants. The perfect fly is about seven-tenths of an inch across the wings, which are two in number, and transparent. The body is generally more or less banded with brown, or black and yellow, and appears like that of a diminutive wasp. This fly has a peculiar habit of hovering on the wing, apparently without motion or exertion, during the heat of the day, near or over flowers, and when disturbed it darts away with great swiftness; but, if the object that

alarmed it is removed, it immediately resumes the same attitude and spot, only darting off every now and then to chase some other intruding fly from its own peculiar domain, over which it appears to imagine it possesses absolute sway.

These insects are of essential aid to the farmers and planters, as their larvæ materially diminish the numbers of lice which infest vegetation.

The Lady-Bird.—(*Coccinella?*)

The lady-bird is a most valuable auxiliary to the cotton planter, as it destroys the cotton louse, or aphis, by thousands, and is most plentiful where they abound, always being busy at the work of destroying them; and, as such, I consider it one of the most beneficial of insects to the planter.

The larva is a small, bluish black, alligator-looking insect, of about the fourth of an inch in length, spotted with a few orange marks on the sides and backs. Whenever one of them is seen among a colony of the *aphides*, the planter may safely calculate that in a few days the number of the lice will be greatly diminished. The larva, when hungry, seizes an *aphis*, and immediately commences eating him alive. This savory repast being finished, it eagerly hunts about until it has secured another victim, and thus completely destroys all the others upon the leaf. When about to change into the pupa, it fastens itself by the tail to a leaf; the skin of the back splitting open, a small hump-backed, black and orange colored pupa makes its appearance, which, although furnished with the rudiments of wings and legs, is incapable of locomotion or feeding, but remains adhering to the leaf, with the dried-up skin of

the larva still sticking to the end of the pupa. After remaining in this state for a few days, this skin again splits, and the perfect lady-bird emerges, furnished at first with soft wings, but which afterward harden, and serve to transport it to the distant colonies of cotton lice, in the midst of which the eggs are again deposited, to form new broods for the destruction of the planters' greatest pest. The perfect lady-bird also devours *aphides*, but not in such numbers as their larvæ, in which state it also destroys the chrysalis of the butterfly (*Argynnis columbina*), seen so often in the cotton fields. I have repeatedly observed them in Georgia, killing the chrysalides of this butterfly, which hung suspended from the fence-rails, and on the under side of the boughs of trees and shrubs. It appears to attack the chrysalis chiefly when soft, and just emerged from the caterpillar skin. It is in this state that these wandering larvæ attack it, and biting a hole in the skin, feed greedily upon the green juice which exudes from the wound. Sometimes, however, it becomes a victim to its own rapacity; for the juice of the chrysalis, drying up by the heat of the sun, quickly forms an adhesive substance, in which the larva is caught, and thus detained until it perishes. Indeed, so very voracious are these larvæ, that they will even devour the defenceless pupæ of their own species. when found adhering to fences or walls.

Many planters imagine that these lady-birds are in some mysterious manner connected with the appearance of the cotton louse, or even that they are the progenitors of the aphis itself. This erroneous impression is formed in consequence of these insects being always found in similar situations at the same time, and abounding on plants already weakened by the attacks of the cotton louse. Their sudden disappearance is also accounted for, as, with the

decrease of their natural food, the lady-birds also disappear and migrate to neighboring plantations in search of a fresh supply of nutriment. I have actually known several planters who have caused them to be destroyed by their field hands, when and wherever found, and who complained that their plants were still destroyed by the *aphis*, or cotton louse. This was only to be expected, as they had destroyed the natural enemy of the louse, and suffered the pests themselves to breed in peace and safety. I have seen the larvæ of the lady-bird as late as the 18th of November, in Georgia, still busy exterminating the aphis. The yellow, oleaginous fluid, which is emitted by this insect when handled, has a powerful and disagreeable odor, and is mentioned by Westwood, in his "Modern Classification of Insects," as having been recommended as a specific for the toothache.

It may be remarked, however, that there is a much larger species of this insect which does considerable damage to the leaves of cucumbers, melons, squashes, etc., as both larvæ and perfect insects devour the leaves and eat holes in them, so as sometimes totally to disfigure and destroy the plants.

The perfect insect measures nearly half an inch in length, and is of a yellow color, with twelve large and small black spots on the wing-cases, and four small black spots on the thorax; it can be very easily distinguished, however, from its beneficial congener, both by size and color, the useful lady-bird being only about the sixth or the seventh of an inch in length, and of a bright-red or almost scarlet color, with black spots, while the injurious insect is much larger, measuring nearly half an inch in length, and being of a light-yellow color, spotted with black.

The Lace-wing Fly.—(*Hemerobius?*)

The larva of the lace-wing fly is furnished with two long and sharp jaws, by means of which it seizes the cotton louse, and in a few minutes sucks out the juices, leaving merely the white, dried skins to show where it once commits its ravages. The eggs are very singularly placed at the end of a thread-like filament, fastened to the under side of the leaf, and are generally deposited near a colony of lice, in clusters of a dozen or more together, causing them to appear to the casual observer like a bunch of fungi. The eggs being hatched in the midst of the cotton lice, the young larvæ commence their work of extermination, seizing the younger lice in their jaws, and holding them in the air, and in despite of their struggles, sucking out the juices, and finally throwing away the empty skins.

The larvæ of this insect are not quite a fifth of an inch in length, and are furnished with a sort of apparatus at the extremity of their tails, by means of which they are capable of adhering to a leaf, even when all their feet are detached, thus being guarded against accidental falls during high winds that might otherwise destroy them. When ready to change, a thread is spun from the tail, and, often forming a rough sort of cobweb, the insect spins a semi-transparent, ovoid cocoon, from which it emerges as a beautiful, bright-green fly, with two brilliant eyes, which sparkle like gold, and four transparent wings, of a greenish cast, delicately veined and netted with nerves resembling the most beautiful lace-work; and hence the common name. This splendid insect, however, emits a most nauseous and fetid odor when held in the hand.

SECTION II.

ACCIDENTS AND DISEASES OF THE COTTON PLANT, USUALLY FROM OTHER CAUSES THAN INSECTS.

Cotton, like many other plants, is subject to diseases, caused principally by accidents, the defects of the soil in which it grows, the depredations of insects, and the effects of the weather. Those which are the most fatal may be described as follows:

SORE-SHIN.

One of the diseases to which the cotton plant is subject, commonly known among planters as the "sore-shin," is sometimes occasioned by a careless stroke of the hoe, scraping the outer bark from the stem while the plant is yet young and tender. The sap being arrested by the wound, that part of the main stem above the injury dwindles away, becoming both weak and brittle. Although the regenerative powers of the plant may afterward produce new bark from the sides of the wound, and the injury heal up, leaving only a larger or smaller cicatrix, or scar, according to the extent of the wound received, the stem eventually becomes so attenuated and weak as frequently to break off at or above the place where the wound was first made.

The preventive of this disease would be, to take great care when hoeing, not to bruise nor injure the young plant, as, when the growth is once stopped by an accidental bruise, or abrasion of the bark, the plant, if not broken down by storms, or the weight of its own top foliage, will always appear stunted or weak.

There is also said to be another species of "sore-shin,"

to which the young cotton plant is liable, differing entirely from that occasioned by careless hoeing, the cause of which is attributed by many to cold, cutting winds, when the plant is very young. Others, however, assert that, when a high wind shakes the tender plant, the main stem is so much bent and twisted, that the sap vessels are upturned, and a serious injury occurs; but the wound is sometimes healed, and if the cotton grows vigorously afterward, it apparently outgrows the shock.

FRENCHING.

In certain portions of the plantations, in many parts of Florida, individual plants grow with white or variegated leaves. This peculiarity is termed "Frenching;" but, as I observed only a few thus marked, it may, perhaps be only a sport of Nature, similar to the variegated leaves of cultivated plants of our gardens. Indian corn, however, is subject to "French;" and, in this case, the disease has been attributed to some imperfection of the soil; to improper use of manures, as well as to various other causes. Be this as it may, it appears as if only certain spots, varying in area in the same field, are attacked, sometimes in succession, year after year, while the remainder of the crop is perfectly healthy and good. When corn is thus *Frenched* on what are termed "Frenched lands," it grows light-colored, sometimes almost white, or striped, and bears no crop. Until this Frenched land has been thoroughly and properly analyzed, it would be useless to say any thing more on a subject so little understood; and I merely mention this disease here to invite public attention to it, and to induce practical farmers to experiment, in order to find out the cause, and, should one be discovered, to suggest some remedy for its removal.

THE EFFECTS OF A BAD SUBSOIL.

When on the plantation of Major Haywood, of Tallahassee, in Florida, in the month of August, several very fine and apparently healthy cotton plants, from four to five feet in height, covered with forms and bolls, were observed to be dying suddenly, in certain spots, the leaves being withered, as if the damage had been done within twenty-four hours. Such plants eventually died; and, on taking them up, no worm, insect, nor injury, either external or internal, could be discovered; and the only conclusion that could be drawn was, that some of the roots had suddenly penetrated into a soil totally unfitted for, and evidently deleterious to, the life of a plant. What rendered it the more singular was, the fact that other cotton plants were growing most luxuriantly within one or two feet of that which was stricken.

THE RUST.

The cotton plant is also subject to a disease called the "rust." The leaves, when first attacked, appear rather yellower than the rest, with red spots on the surface, and often margined with the same red color. These leaves then turn yellower and redder every day, until the plant assumes a bright-red or almost a carmine appearance, when, finally, the whole of the foliage turns more of a brown color, and falls to the earth. When the disease attacks the boll, it assumes a different appearance, and is termed the "red" or "black" rust, as the case may be. The cotton, in such bolls as have been attacked by the black rust, and the bolls themselves, shrivel up, and turn dark-colored, as if they had been severely blighted or mildewed, and are totally valueless.

This disease has been attributed to leaving pokeberry plants in the field. But this I have never observed, and suppose the assumption to be on the same principle that the mildew on wheat was formerly attributed to the influence of the barberry bush. Others state that rust is owing to an undue proportion of lime in the earth, and it is no doubt caused by some organic or inorganic imperfection of the soil in which it is grown; but until such soil shall have been thoroughly analyzed, and its component parts correctly ascertained, nothing certain can be known about it. There is also another theory in regard to the subject of the rust—that it is entirely owing to atmospheric changes, and not to the soil. Experiments, however, ought to be instituted to find out the real cause, and the result made known, as the disease has done, and is at present doing, much injury to the crops of the South. Salt, sown at the rate of half a bushel to the acre among cotton, is stated to be a certain preventive of the rust, and to restore the plant to its former vigor; but several planters whom I have spoken to on the subject, deny the fact, and say that salt had no effect whatever.

There is also another species of rust caused by an *acarus*, which will be found described on a preceding page.

SHEDDING OF YOUNG BUDS, OR BOLLS, CAUSED BY WET WEATHER.

When the cotton blooms, or flowers, are exposed to the heavy and beating rains of a Southern climate, especially between the hours of ten and two, as they are opening, or have already opened, it frequently happens that such blooms prove barren. The outer calyx turns yellow, and eventually the unfertilized flower and immature boll fall to the ground, the seeds turn brown, and the fibre of the cotton is worth-

less. This is generally attributed to the heavy drops of rain washing away the pollen, which should have impregnated the pistil; the embryo seed-vessel, of course, never matures, but dries up and perishes. Bees, wasps, and insects in general, are Nature's agents in distributing the pollen, or fertilizing dust. As they fly from flower to flower, small particles of this dust adhere to some part of their bodies or limbs, with which they impregnate the next flower while in search of honey or more dust.

Sometimes the pistil and stamens of a cotton bloom are found eaten in such a manner as to distort them. This injury is often caused by the very young boll-worm, which, penetrating the young flower bud by a hole through the outer calyx, where the egg was laid, after eating several of the enclosed stamens and anthers, and injuring one side of the pistil, bores into the embryo boll, before it is shed. I have reared several caterpillars found in such situations, and proved them to be the true boll-worm. Moreover, I have found the hatched shell of the egg on the outer calyx, and traced the caterpillar's track through the petals to the stamens, and finally to the boll itself. I will not, however, enlarge on this subject here, but refer to the article on "The Boll-worm," in a former part of this work.

THE ROT.

The "rot" has been attributed to a variety of causes, such as changes in the atmosphere, defects in the soil, the attacks of insects, and to the growth of fungi. Mr. Troup, in the "American Farmer," describes its appearance with great accuracy. He says: "The first indication is seen in a small circular spot on the outside of the boll, exhibiting a darker green than the circumjacent parts; as if a globule of water had been dropped upon it, and been absorbed.

Many of these are frequently seen at the same time on the same boll. They spread themselves, sometimes faster, sometimes slower, as if induced, either by the state of the atmosphere, or condition of the plant, changing color as they progress, until they assume a dark brown, approaching to black, and until the whole exterior is in like manner affected; or until it receives, from some cause, a sudden check, and then this appearance is only partial. In the first case, the disease has penetrated to the centre of the fruit, the fermentation is complete and universal, and is seen in a frothy, white liquid thrown out on the surface. Putrefaction follows, and the destruction of the seed and immature wool being finished, nothing is left but the rind, or exterior coating of the boll, which, exhausted of its juices, hardens, turns black, and thus terminates the process. In the other case (that of suddenly checked disease), the interior of the boll in some instances remains unhurt; in others, it is only partially injured; and, in the last case, the pods, remaining unhurt, mature and expand. This, however, rarely happens, as the disease is wonderfully capricious, going and coming unaccountably, attacking at one time with more, at another with less violence; so that the fruit, which escapes entire destruction on the first attack, may fall a victim on the second. Nor is this capriciousness justly attributable to the changes in the atmosphere, as its origin does not seem to have any connection with the weather."

It is very difficult to find out the true cause of this disease, as it sometimes appears in dry as well as in wet years, although it is generally more destructive during rainy seasons. The young bolls are often found rotted, as well as the half-matured and old, so that the age of the fruit does not appear to have any thing to do with it. Many of them

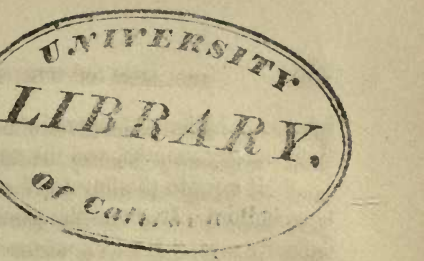
may have the interior entirely dried up and destroyed, while others will open with only one or two segments rotted, the rest being perfectly healthy, and filled with good white cotton.

As to the theory of a defect in the soil, it has been stated by some planters that barnyard manure will often produce it; but, if this is the case, it is somewhat singular that it has often been observed that one plant may be very badly affected by the rot, while others on each side are perfectly healthy and uninjured, as has often been observed. This fact appears to show that a great deal depends upon the constitution of the plant itself, which may be inherited from its parent, and perhaps a choice of good sound seed, from strong and healthy plants only, might in time have a great effect in remedying this disease; and, as we know that much depends upon the vigor, health, and prolific qualities of the parent plant, it might perhaps be well to make experiments by planting seed of diseased, and sound, healthy plants, in the same situation and soil.

The fungoid growth, found on the old rotted bolls, when they begin to open, may perhaps be regarded more as the result than the cause of the disease. Several insects, it is true, have been found in these rotten bolls, where most probably they had crept for food and shelter, after the boll had become rotten, while others have been caught in the very act of piercing the bolls; but this subject will be found treated at greater length under the head of "The Boll," and insects found in or upon it, on a preceding page.

While on the subject of the rot, it may be well to mention that there are three glands on the inside of the outer calyx, at the bottom of the boll, and three on the outside between the "ruffle" and stalk, which secrete and give out a sweet substance, which ants, bees, wasps, and

plant bugs avail themselves of as food. I have seen young bolls, apparently healthy, suddenly drop from the plant, and, on being carefully cut open, showed a wound which had been pierced by the trunk of some insect, in one of these glands, and that a watery rot had commenced where the boll had been stung. It was evident that this rot had been caused by the piercer of some insect unknown, as the puncture could be traced throughout its length to the heart of the lower part of the injured boll.



CHAPTER XI.

CONCLUDING REMARKS—THE COMPLICATED NETWORK OF COTTON—INDUCEMENTS TO IMMIGRANTS—ADVANTAGES AND DISADVANTAGES—FUTURE OF THE SOUTH.

We wish to make a short, summary statement, and draw our labors to a close.

1. Prior to the abolition of slavery, the production of cotton employed capital to the amount of two billion dollars: landed property and implements being estimated at about two hundred million dollars, and the balance estimated as the value of the slaves.

2. Since the abolition of slavery, the capital invested in the production of cotton in the United States does not exceed two hundred million dollars.

3. It furnishes labor in the field for one million of souls.

4. It feeds the spindles of one thousand manufactories in the United States, and of five thousand manufactories in Europe.

5. It has paid nearly two-thirds of the national debt of the United States for the last fifty years.

6. It is a wonderful source of wealth, enriching the planter, the manufacturer, the cotton broker, the ship-master, and the merchant.

7. It has, within the present century, cheered the

hearts of billions of operatives in both hemispheres, fed their hungry mouths, and the mouths of their dependants.

8. It goes to the hovels of wretchedness, and administers comfort. It enters the palace of the millionnaire, and defiantly says, "Do without me if you can!"

9. In all the complications of agriculture, manufactures, and commerce it bears an important part; yea, exercises a controlling influence. If "commerce is king," cotton is prime minister.

10. The cotton locks of the South are the best on the face of the globe, and must have an increasing demand.

11. The labor of the present year will probably produce 1,500,000 bales; certainly not more, and perhaps less.

12. The amount on hand now in England, together with all she will likely receive from all other countries than this, cannot supply the demand. England wants 4,000,000 bales. She will probably receive 2,500,000 bales from all other countries besides North America. Deduct this from the 4,000,000, and we have exactly 1,500,000 bales.

13. But what will France do, and Belgium, and Switzerland, and the German Zollverein states? They all want some of our cotton, and will have it.

14. The demand for cotton in England and on the Continent, for the year 1867, will be unprecedented. It ought to command a good price.

15. The cry will be for years to come, ay, for ages, "Give us more cotton—good cotton, American cotton—fine fibre."

16. Cotton being in such great demand, laborers will be well compensated who prove themselves faithful to their employers.

17. Cotton lands will be in good request, and must bear a good price.

18. If protected by the government by the simple and most beautiful process of letting us alone, and placing no obstacles in our way, there is laid up for us, in our soil, an incalculable amount of wealth.

To industrious immigrants we say, Come on, and try the country. We have some disadvantages in many parts of the South, physical and moral, but these are found elsewhere. Much of our country has been laid waste by the ruthless hands of the destroyer and the robber, but it is fast recovering. We have the miasmatic fevers of the Mississippi Valley, but they are not more fatal than the same forms of disease away out in the West.

We have mosquitoes, buffalo-gnats, and gad-flies, but they do not continue all the year. We have the boll-worm, the cotton louse, and the cotton caterpillar, which sometimes sadden the heart of the planter, but we always make something, and not unfrequently we make "a mighty big crop."

We close our volume by an extract from the "Prison Life of Jefferson Davis:"

"In ten years, or perhaps less, the South will have recovered the pecuniary losses of the war. It has had little capital in manufactures. Its capital was in land and negroes. The land remains productive as ever. The negroes remain, but their labor has to be paid for. Before the war there were 4,000,000 negroes, and the estimate that 1,000,000 have died off during the war is too large.

"As to a mingling of the races, Nature has erected ample barriers against the crime. There is no danger of its prevalence.

"The blacks are a docile, affectionate, and religious people; like cats in their fondness for home. The name of freedom had charms for them; but until educated to be self-supporting, it would be a curse.

"If herded together in military villages, and fed on rations gratuitously distributed, rum, dirt, and disease would devour them off the face of the earth in a few years. With peace established they would return, in ninety-five cases out of the hundred, to their old plantations, and work for their old masters.

"The value of the slaves before the war was two thousand million dollars. This is all gone. Still the negro's labor remains; and with this, and such European labor as will be imported, and such Northern labor as must flow South, the profits of the Southern staples will not be long in restoring material prosperity.

"The negro, in his freedom, will not make more than six bales of cotton per year. Under the old system of labor he made ten. But the price has more than doubled, and his labor now must yield a large profit.

"The land will not pass to any great extent from its former proprietors. They will lease it for a few years to men with capital, and then resume working it themselves, or sell portions of it with the same object, not materially decreasing their own possessions.

"When the country is quiet, and the profits of the crops come to be known, there will be a rush Southward from the sterile New England regions, and from Europe, only equalled by that to California on the discovery of gold. Men will not stay in the mountains of Vermont and New Hampshire, cultivating little farms of from fifty to a hundred acres, only yielding them some few hundreds a year profit for incessant toil, when the rich lands of the South, under skies as warm and blue as those of Italy, and with an atmosphere as exhilarating as that of France, are thrown open at from a dollar and a half to three dollars per acre. [Rather too low an estimate at this time. Say

from three dollars to thirty.—B.] The water power of the South will be brought into use by this new immigration, and manufactures will spring up in all directions, giving abundant employment to all classes."

One year and three months have elapsed since the utterance of the foregoing prophecy by the distinguished prisoner at Fortress Monroe. Since that time, we have seen crowds of negroes coming home to their old masters. We have seen many of them dying at military posts. We have seen the grasping Puritan leasing land at ten dollars per acre, hiring Southern overseers, and making money. We have seen some of them try the experiment with a few trifling white men and as many trifling freedmen, and make a perfect failure.

We have seen manufactures springing up, as if by the magician's wand, all over the South. We have seen our noble women encouraging their husbands and sons to work. We have seen our brave young men marching in files and columns to the field to fight the enemy, chopping cotton to the music of "*Dixie.*"

And while viewing these things, and trying to look into the future, we called to mind a lesson impressed on us more than forty years ago by a worthy teacher. "Boys," said he, "who was the first laborer?" Some said Cain, some Abel, and some Adam.

"You are all wrong," said our worthy president, "God was the first laborer. Don't you remember *Deus creavit cœlum et terram intra sex dies?* And, again, it is said, He rested from His *labor.* Now translate this short sentence, *Labor vincit omnia.*" With wonderful concord we all exclaimed, "Labor conquers all things."

PROSPECTUS

OF THE

METROPOLITAN RECORD,

AND NEW YORK VINDICATOR.

ENLARGEMENT OF THE PAPER

FROM SIXTY-FOUR TO EIGHTY COLUMNS.

THE POLITICAL PLATFORM OF THE RECORD.

After the publication of the 26th number of the RECORD, of last year, we increased ITS SIZE from SIXTY-FOUR to EIGHTY COLUMNS. IT IS NOW THE LARGEST DEMOCRATIC AND FAMILY PAPER PUBLISHED IN THE UNITED STATES; and, although our expenses are very heavily increased by the change, we supply the paper AT THE SAME PRICE. The reading matter is of a more varied and interesting character, on account of the greater space placed at our disposal, and which is equal to FOUR ADDITIONAL PAGES, or SIXTEEN COLUMNS. We are encouraged to this change by the success that has attended our efforts to present the public with a paper that has held fast, through every vicissitude, to the two cardinal principles of State Rights and Self-Government, and that refused amid the fearful conflict of the past four years to lower the banner on which those principles were inscribed. We feel certain that this effort on our part to render our paper in every way deserving of the continued support of our friends, will be met by a generous and active coöperation on theirs in enabling us to extend its circulation. We know it will gratify them to be told that, despite the malice and persecution of our political enemies, despite the suppression of the RECORD and the arrest of its editor, despite the official power which was wielded to our disadvantage and material injury, we have been enabled to weather the storm in which so many went

down, and are now looking forward with hope to a greater degree of usefulness in the future. For our part, we have no change whatever to make in our principles. The great political dogmas enunciated by the men of 1776, are as true to-day as they were then; and, though they have been forgotten by the people and trampled under foot by arbitrary power, it is only by a return to them that popular freedom can be saved from the dangers by which it is beset, through fanatics on the one hand, and designing and unprincipled politicians on the other.

We see no reason, after a full survey of the whole political field, to despair of the ultimate success of the principles for which we have contended. Force has been applied, and it has not decided, because it was not competent to decide, that the principles of State Rights and Self-Government have ceased to exist. It is needless to pursue this subject further, as its force must be apparent to every unbiased and impartial mind.

The future is before us, and as a journalist we shall perform our duty hereafter as we have performed it in the past. We have, as we said, no change to make. The RECORD'S platform of principles remains the same. It will be henceforward its aim to be a truthful and unswerving exponent of State Rights, and it is therefore inflexibly opposed to the anti-Democratic policy of consolidation. Believing that popular freedom in this Republic is dependent upon State Sovereignty, it is at war with all despotic encroachments on that principle and the rights of the people. It shall never cease to advocate the supremacy of the Civil Authority, and to denounce and condemn the pretensions and usurpations of Military Power.

In the future, as in the past, the RECORD will continue the faithful advocate of Democratic principles. It is true that recent events, brought about by a fanatical interference with the rights of States, and by an intolerance of the Constitution and laws made in accordance therewith, have caused a temporary revulsion; but the principles of the great revolution are only kept in abeyance, and will, we believe, be reasserted ere many years elapse. The people have yet to learn from experience that the lessons and teachings of the great statesmen who formed the Republic cannot be set aside unless by the total overthrow of popular freedom and self-government. No fact was more completely established, no principle more thoroughly vin-

dicated, than that which asserts that "Government derives its just powers from the consent of the governed," and that a Union which can only be perpetuated by the strong arm of military power, must, if continued to be so sustained, result in the establishment of a centralized despotism.

The RECORD and VINDICATOR shall continue, as it has begun, the outspoken and fearless opponent of every act of unconstitutional policy, the defender of the great Charter of American Freedom, and the unflinching advocate of Liberty of Speech, Vote by Ballot, Habeas Corpus, Trial by Jury, Freedom of the Press, and State Rights.

LITERARY DEPARTMENT.

We devote special attention to this part of the RECORD, as each number bears ample testimony, and the "Portfolio" is one of its best and most successful features, blending, as it does, the humorous and the poetical with light sketches, anecdotes, and incidents in endless variety. All the contributions to this department are original, and the general approbation with which it has been received by the reading public stamps it as a complete success. We may add that the original poetry, which appears in this and other parts of the paper, is not surpassed, if it is equalled, by any journal, American or European.

THE FICTIONAL DEPARTMENT.

While ignoring the unhealthy and sensational style of too many of the current periodicals, we aim to make this department unsurpassed in point of interest to the best works of imagination, and shall leave nothing undone to render it equal, in its collection of original stories and tales, to the most popular and highest class of the fictional productions of the day. We are determined that no paper shall excel ours in this important feature, and that the younger portion of our patrons will find in its entertaining and pleasant reading a happy substitute for the dubious kind with which the country is unfortunately flooded.

THE EDITORIAL DEPARTMENT.

In our political platform we have presented the principles of the RECORD, and it shall be hereafter, as it has been in the past, our great object to sustain its reputation in this great and vital particu-

lar. The frank and outspoken manner with which all the subjects that properly come within the scope of this department have been treated, will be adhered to throughout. The editor firmly believes that the principles which he advocated and sustained during the late fierce and bloody four years' war, are, if possible, more essential now than ever, and that in their success alone can the great Revolution of '76 find its best and most practical development.

THE NEWS DEPARTMENT.

It is our aim to give in the RECORD a complete resumé of news, both through the correspondence and the general intelligence, prepared expressly for its columns. Our Foreign and Domestic Summary, in which the important intelligence of the day is given, is all rewritten, so that our readers are saved the trouble of poring over long and tedious statements and accounts to get at the points of the news. The commendation which this department of the RECORD has generally received is the best proof of its success.

MISCELLANEOUS.

In addition to the departments enumerated, we give from time to time art and scientific matters due attention, and occasionally present an interesting and instructive *melange* of miscellaneous reading.

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